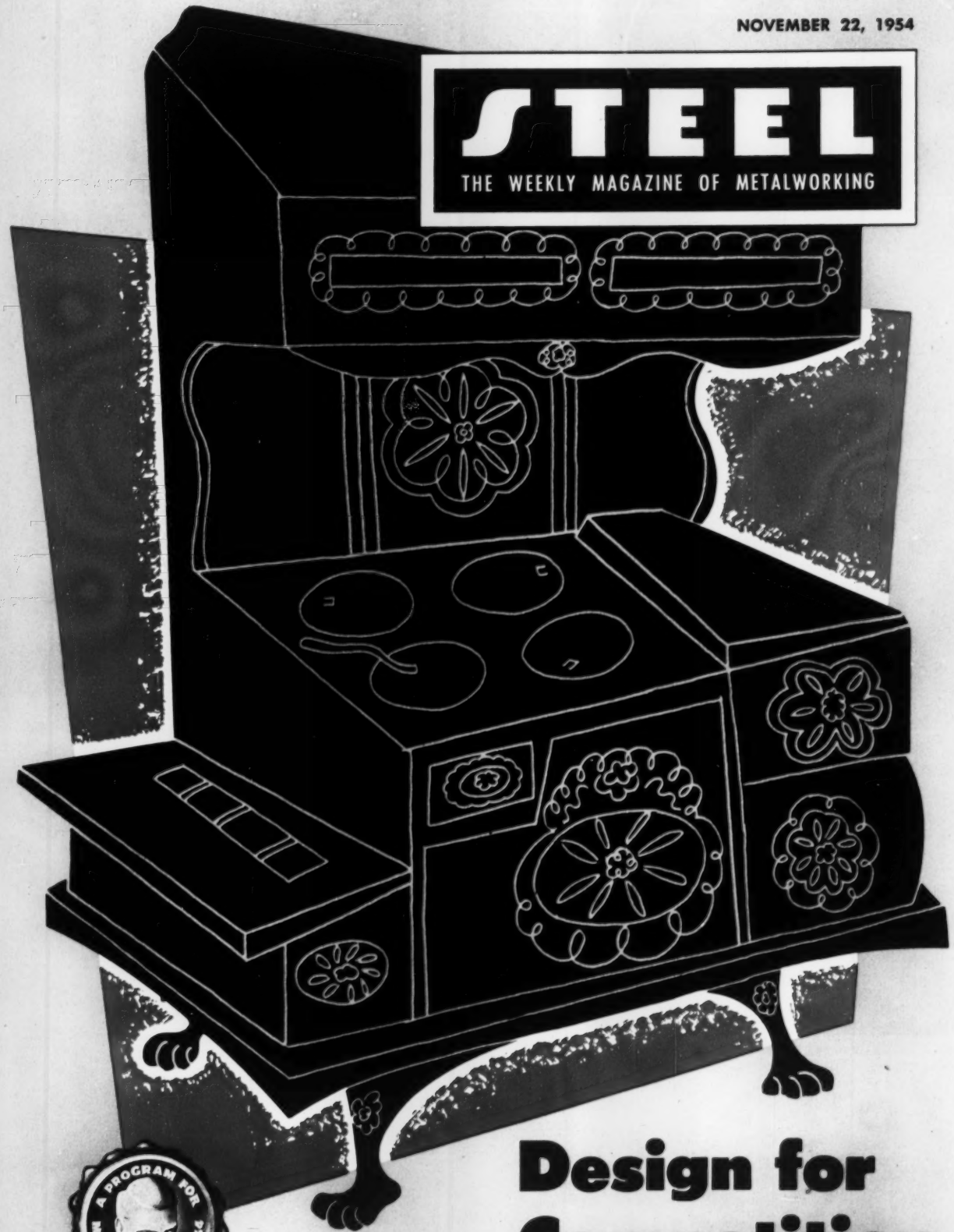
NOVEMBER 22, 1954

STEEL

THE WEEKLY MAGAZINE OF METALWORKING



A PROGRAM FOR MANAGEMENT IN 1954

Design for Competition

No. 10 in 1954 Management Series, p. 81

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new DESIGN...

more protection with full accessibility

* New Allis-Chalmers slip-ring motor with inspection cover and upper half of end shield removed. Note accessibility of brushes, protection of bearing.

ALLIS-CHALMERS LARGE SIZE SYNCHRONOUS AND WOUND-ROTOR MOTORS have been completely redesigned with longer stator yokes and shorter end shields. Collectors and brushes are located inside the yoke for protection against physical damage, dripping moisture, dust and dirt.

Capsule-type bearings give better bearing protection, too. The upper half of the end shield may be removed for inspection or cleaning of the interior of the motor without disturbing the exciter or exposing the bearing to the ravages of dirt, dust and oil contamination.

All leads enclosed — Both primary and secondary winding leads are brought out through separate conduit boxes. There is no loose wiring . . . no exposed leads anywhere.

Easy maintenance — Even though the new design offers maximum protection to brushes and collectors, internal parts are fully accessible for inspection and maintenance through large openings in the stator yoke. Opening covers are readily removed and are secured during operation by easy-operating, self-locking fasteners.

Get details now — This new design is available from approximately 250 hp at 300 rpm and up, in drip-proof and splash-proof construction. Call your Allis-Chalmers representative for complete details or write Allis-Chalmers, Milwaukee 1, Wisconsin. Ask for Bulletin 05R8183.

A-4464

ALLIS-CHALMERS

If It's a Special Bolting Job It Calls for a "SPECIAL"

Of course you can many times use standard fasteners to solve a special bolting problem—and often get away with it. But it isn't always the practical thing to do. Most times, when the job calls for a bolt of special shape or size, then it's time for a "special" — a bolt that is specially designed for that particular application.

That term "special shape or size" can take in a lot of territory. At our fastener plant at Lebanon, Pa., and in our plants on the West Coast, through the years we've produced just about every type, size and shape of fastener imaginable. Extra-long bolts. Stubby bolts. Bolts with rectangular heads or twisted shanks. Zee-bolts. U-bolts. Hook bolts. And lots more.

In addition, our versatile staff of engineers have had such long experience in producing specials that they can often improve on existing designs. Or, after analyzing a problem, they may come up with a completely new idea, resulting in greater economies for the user.

If you have a bolting application for which you believe the advantages of a special fastener may outweigh those of a standard, put it up to us. We'll be pleased to have our engineers study the problem, and offer their recommendations.

BETHLEHEM STEEL COMPANY
BETHLEHEM, PA.

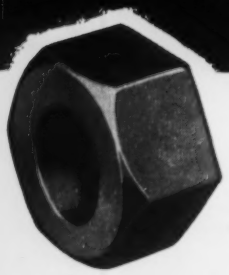
On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation. Export Distributor: Bethlehem Steel Export Corporation

Bethlehem Bolts Are Good Bolts

BETHLEHEM STEEL

4200 Nut Blanks Per Hour

Feed rolls push barstock through TOCCO Induction Coils to heat stock to 2350°F for forging.



with TOCCO* Induction Heating

FASTER PRODUCTION—4200 nut blanks per hour—twice the output of a conventional hot punching machine—that's the result of Lamson & Sessions Company's new automatic production set up with TOCCO Induction Heating.

OTHER ADVANTAGES—TOCCO delivers exact temperatures (2350°F, plus or minus 25°) and delivers them so fast that scale has little time to form. Scale loss has been reduced to only about 1% for hot-rolled stock. TOCCO is clean and cool, fits right into the production line—no hauling to and from the heat-treat department—no unpleasant radiant heat to annoy workers.

HERE'S HOW IT WORKS—Steel bars up to 1½" diameter are fed through TOCCO Induction Coils. The first two coils, operating off a 300 kw, three kc TOCCO motor-generator set, preheat the rod. The third coil which operates from a TOCCO 250 kw 10 kc generator then boosts the rod to forging temperature. The hot rod then is fed to the special hot nut former (designed and built by NATIONAL MACHINERY CO.) which shears the rod to suitable lengths, forms the part and spits out the nut blank—ready for tapping.

In your search to find sound methods of increasing production, improving products and lowering costs, don't overlook TOCCO Induction Heating. If your products require heat treating, soldering, brazing or forging, it will pay you to investigate TOCCO for better, faster ways of producing them at lower unit costs.

THE OHIO CRANKSHAFT COMPANY

TOCCO

Mail Coupon Today

FREE BULLETIN

THE OHIO CRANKSHAFT CO.
Dept. S-11, Cleveland 1, Ohio

Please send copy of "Typical Results of TOCCO Induction Heating for Forging."

Name_____

Position_____

Company_____

Address_____

City_____ Zone____ State_____

what's new in GIANTS?

This 8¾" SCHIESS model BF horizontal boring and milling machine . . . Now completely redesigned with many innovations. Here are a few . . .

Two individual drives—gear-drive for roughing, belt-drive for finishing. Belt-drive particularly suited to high-speed machining with carbide tools. New tool clamping device—does away with draw keys, hammers, drifts and binding screws. All spindle-slide movements controlled from easily accessible operating platform (or from pendant station or portable control panel, if desired). Special main-drive belt requires no readjusting. Column, spindle-slide and boring spindle may be adjusted at rapid traverse.

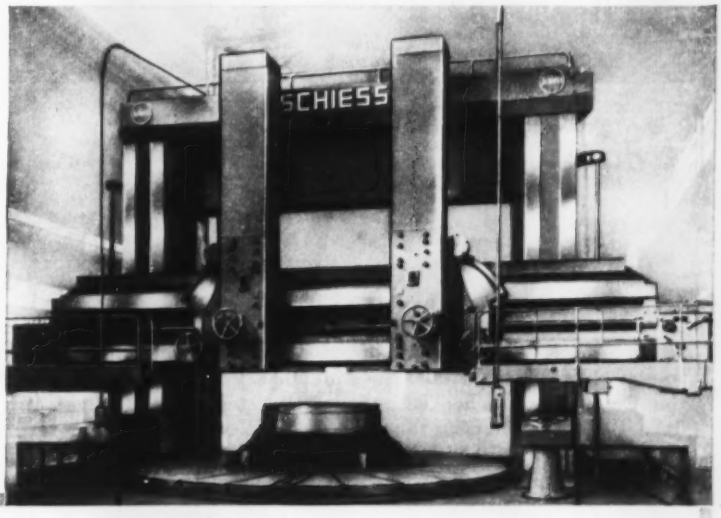
Spindle diameters, $6^{5}/_{16}$" to $8^{7}/_{8}$". Maximum diameter bored, 59"—faced, 79".

It takes Europe's largest builder of heavy machine tools, Schiess, to turn out giants like these. Parts and service as close as Pittsburgh. And an American Schiess engineer will be happy to help you size up these heavy producers for your heavy production needs. Write for catalogs and complete specifications on all Schiess BF and K models.

This 23 ft. SCHIESS model K vertical boring mill . . .

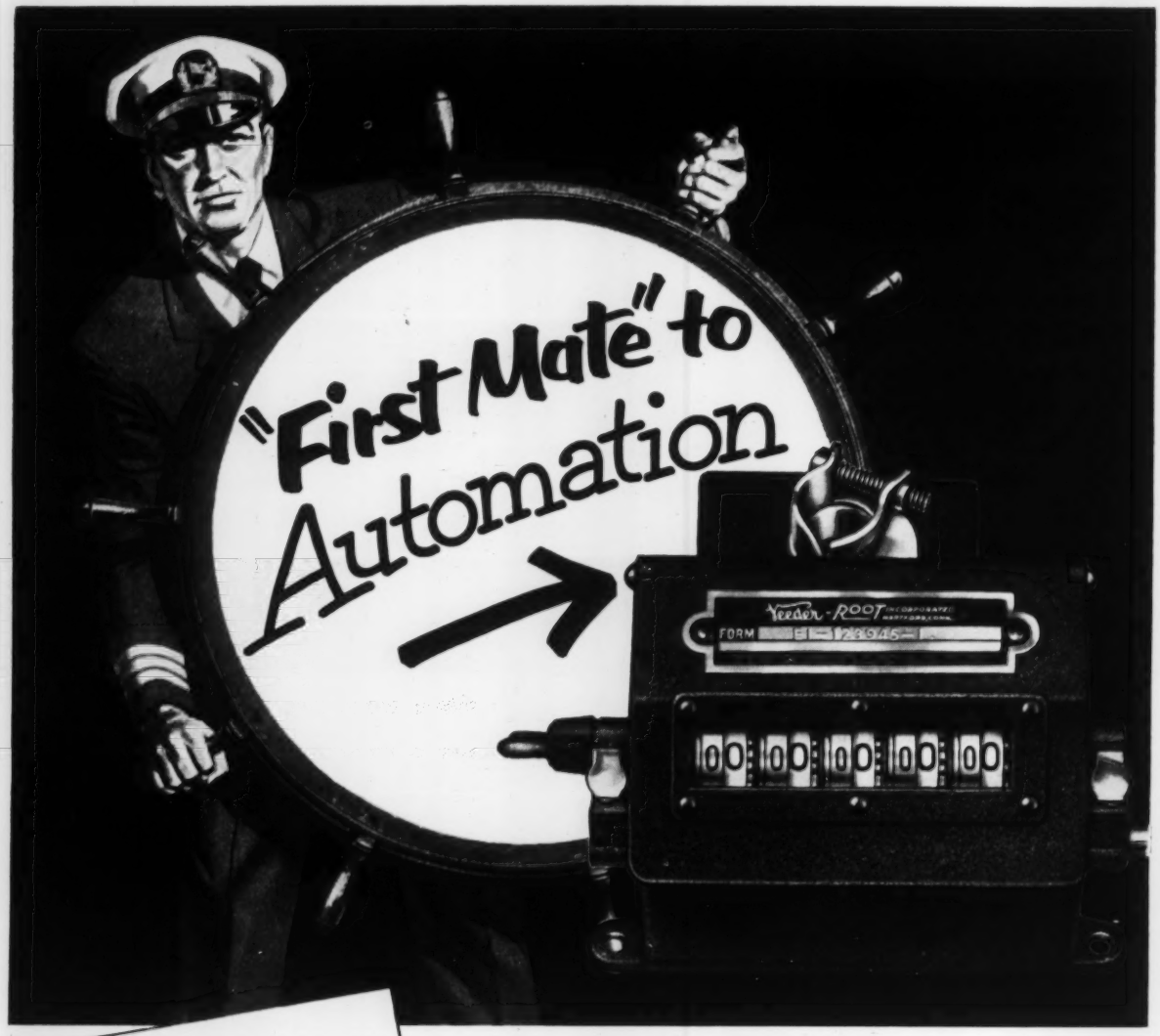
Look at all these new features—each one a time-saver! Rapid traverse motions with pushbutton control of changeover from feed motion to independent power traverse. Electro-mechanical locking of cross-rail to columns. Fingertip speed control—counterbalanced cross-rail and side-head—completely enclosed swiveling octagon rams—pendant control—automatic lubrication.

Turning diameters in standard sizes range from 8 ft. to 23 ft. (which can handle stock up to 100 tons!). Basic Schiess designs permit extra heavy machines, normally considered specials, to be built to your work diameter and load requirements. Even a diameter of 84 ft.!



Engineering Division
AMERICAN SCHIESS CORPORATION
38th Street and AVRR, Pittsburgh, Pennsylvania

Sole Distributor
KO KURT ORBAN COMPANY, INC.
34 Exchange Place, Jersey City, N. J.



Added Evidence that . . .

Everyone Can Count on VEEDER-ROOT

In figuring out new systems of automatic electrical control, Veeder-Root *Count*rol can supply vital connecting links. For instance, this Predetermining Counter can be hooked into such a system to light a light, ring a bell, or actuate a mechanism to stop a machine or process *at any pre-set point.* And there are many other Veeder-Root Counters that can serve as "countponents" in almost any way desired. Or special counters can be designed for specific applications. Engineers in any industry, now engaged in working out automatic control systems, can count on Veeder-Root engineers to work with them on any problem where reliable facts-in-figures are needed.

VEEDER-ROOT INCORPORATED • Hartford 2, Connecticut

Chicago 6, Ill. • New York 19, N. Y. • Greenville, S. C. • Montreal 2, Canada
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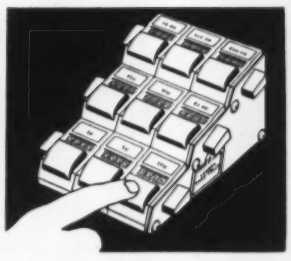
"The Name That Counts"



New *Vary-Tally* Multiple-Unit Reset Counter comes in any combination up to 6 banks high, and 12 units wide Write for news sheet and prices.

This Week in Metalworking

STEEL
THE WEEKLY MAGAZINE OF METALWORKING

Vol. 135 No. 21 November 22, 1954

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IS A
PLA-TANK® STACK
THE ANSWER
TO YOUR
FUME PROBLEM?

Shown here is a light-weight, easily-erected PLA-TANK stack which handles fume exhaust at the new thorium plant of the Lindsay Chemical Co., West Chicago, Ill.

The stack has a 44" diameter, is 69' long including 90° elbow, cross run to fan chamber and riser beyond fan. There are inlets from three floors to handle exhausts from individual tank systems. Stack was prefabricated with flanges for fast installation.

PLA-TANK STACKS may also be the answer to your problem of venting corrosive fumes — inside or out. Consider these many advantages

- . . . manufactured from long-life, resin-bonded glass fiber laminate
- . . . resistant to a wider variety of fumes and temperature than ever before
- . . . not affected by extremes in weather
- . . . light weight, easy to install; need less rigging and support; save handling, freight, shipping charges
- . . . competitively priced; available in diameters to 60"

Let us help you solve your problem the modern way — with PLA-TANK STACKS. Write today for free data sheets.

P-20

THE Chemical CORPORATION
56 Waltham Ave., Springfield 9, Mass.

FREE!
ULBRICH
Stainless Steel
Strip calculator
takes the guesswork
out of buying!
SPECIALISTS in small orders of Strip, flat wire and other stainless steels — a foot, a pound or up — converted to your exact requirements.
The BIGGEST little Converting Mill in the country wants you to have its copyrighted stainless strip calculator.
Example: Your engineers want 1000 ft. .062" gauge, ½" wide. What WEIGHT will you order? Calculator gives quick answer — 188 lbs.
For free calculator send your name on your letter head or on the margin of this page to
ULBRICH
Stainless Steels
WALLINGFORD 2, CONN.
Phone: Wallingford 9-7771

behind the scenes

Goodby, Mr. Shaner

By this time, most of the world knows that STEEL's beloved Editor-in-Chief, Earl L. Shaner, is dead. Vital facts about him have been widely printed: dates, accomplishments, honors, so there is nothing more for us to add—except that our tears are very real.

STEEL will never look the same without the Shaner editorial. It will go on, however, reporting news, markets and engineering, and to the casual reader there will be no outward evidence of grief. We are too modern and sophisticated to exhibit emotion.

In other times it was different. One fine day in the Spring of 1865, the English magazine *PUNCH,* which traded heavily in humor, came out with a full front cover cartoon expressing grief over the death of Abraham Lincoln. This was as unusual as it was unexpected, because *PUNCH* was a foreign magazine, and it never really cared for Lincoln; its people didn't wake up to the fact that he was a great man until he was dead.

Those of us who work for the Penton Publishing Company, publishers of STEEL, didn't expect a cover in mourning, but we were aware of one thing, anyway: we knew that Earl Shaner was a great man long, long before he died. He had that remarkable capacity of meeting anybody on equal footing, and making them feel at ease. If you don't think that's difficult, try to make bank directors and office boys tell you things in confidence.

Goodness Follows

Persons who knew him counted themselves fortunate. He loaned money out of his pocket, surreptitiously and by stealth, as if he feared to be caught doing good deeds. He was the kind of man who, although Chairman of the Board of the Penton Publishing Co., and officer of other impressive organizations, tipped his hat shyly to all female employees, from secretaries to charwomen. He turned up at wakes and funerals, and it is our feeling that the good deeds he did will keep on turning up for years to come.

Shakespeare said that, didn't he? Only the Bard had it backward: he said something about the good being interred with a man's bones. The good that Earl Shaner did is firmly planted in the hearts and minds of those who knew him, and will continue to stir affection and admiration as long as memory lasts.

As a member of the United States Reparations Commission, appointed by President Truman, Mr. Shaner made a quick trip around the world shortly after World War II ended. He was not particularly fond of air travel, and he missed the comforts of home, but he went willingly. He did a tremendous amount of work in the limited time, yet found the opportunity to send a personal postcard to every employee of the Penton Publishing Company! Before he left, he took a list of the company personnel, and during the rushing days that followed he took the time to write a personal note to every employee.

A Plain Man

If you have read his editorials, you know their charm. Mr. Shaner wrote clearly, objectively and sincerely; his style was marked by what some might term an old fashioned dignity, but there was nothing old fashioned about his thinking. Indeed, his clear thinking and facile selection of simple words endeared him to banquet chairmen, and he was in great demand as a speaker. Plain speaking is quite a trick, but Earl Shaner could do it. He always spoke at our bowling banquets, and at Company affairs, and when you heard him you got the impression that there were just the two of you.

He was always exceptionally kind to young editors. Nobody who ever came in contact with him ever came away with the idea that Earl Shaner was an overbearing man. He was quick to tell stories on himself, and the twinkle in his eye was standard equipment.

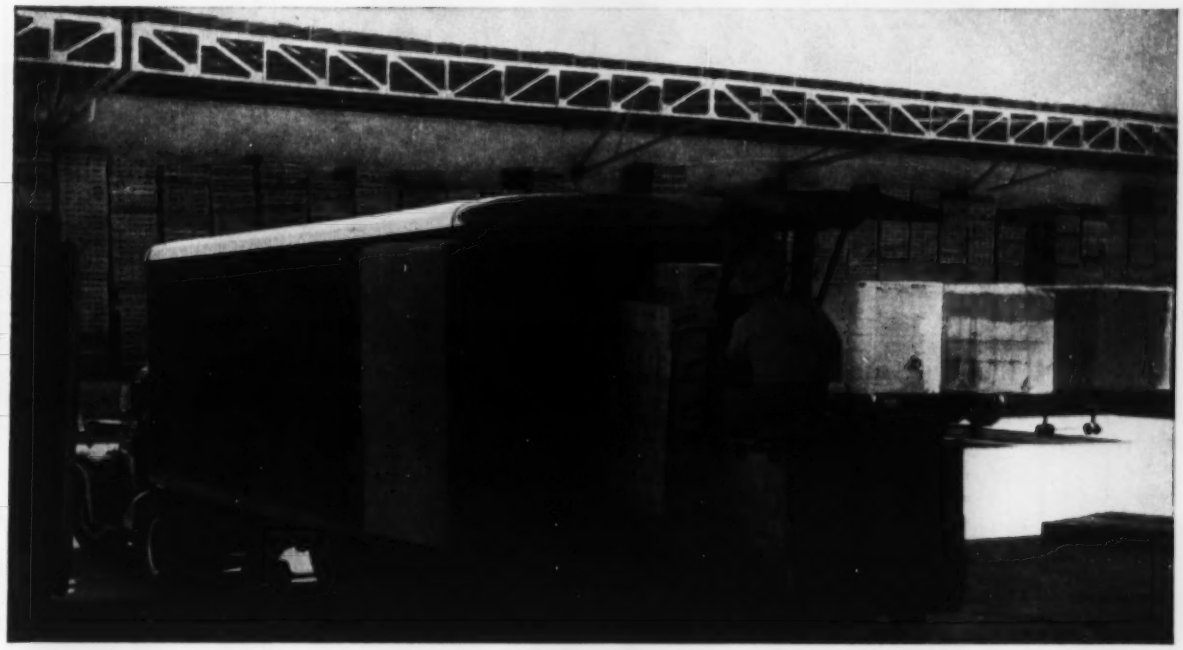
Truly, a good man has gone. Goodby, Mr. Shaner. God rest you.

Shrdlu

(Metalworking Outlook—Page 33)

GET MORE LOADS EVERY SHIFT

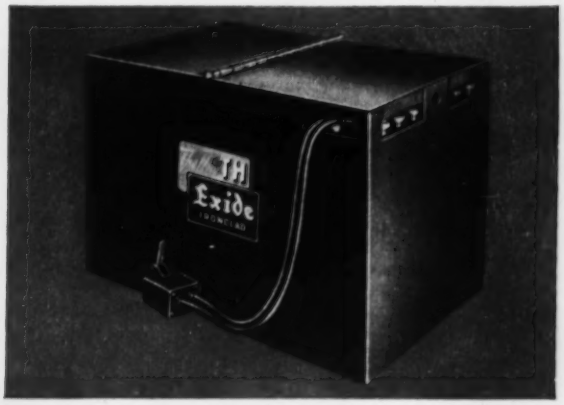
...with dependable Exide-Ironclad battery power!



FAST LOADING of highway trucks is assured by the use of fork trucks powered with Exide-Ironclad batteries. An abundance of reserve power keeps trucks working at full speed the entire shift . . . with no unscheduled down time.

Exide battery power means precise spotting with "finger-tip" control, safe handling, no fumes or fuss. Also, proven lower costs for operation, maintenance, and depreciation make Exide-Ironclads your best power buy—AT ANY PRICE!

THE POSITIVE PLATES are the heart of any battery. Only Exide uses a slotted tube construction. By use of tubes, more active material is exposed to the electrolyte, providing *greater power.* Also, more active material is retained, *giving longer working life.*



THE NEW THRIFTY HAULER! The improved industrial truck battery. *Non-oxidizing* plastic power tubes assure longest battery life, more capacity in the same space. For full details, call your Exide sales engineer—write for Form 1982 (Installation and Maintenance of Motive Power).

Your best power buy ...AT ANY PRICE!

Exide®
IRONCLAD® BATTERIES

Exide INDUSTRIAL DIVISION, The Electric Storage Battery Company, Philadelphia 2, Pa.

CLEVELAND TRAMRAIL...

a Leader in AUTOMATION

of Materials Handling for 30 Years

Automation as applied to overhead materials handling equipment is not new or magic to Cleveland Tramrail. For 30 years, we have engineered a wide variety of installations for handling materials automatically.

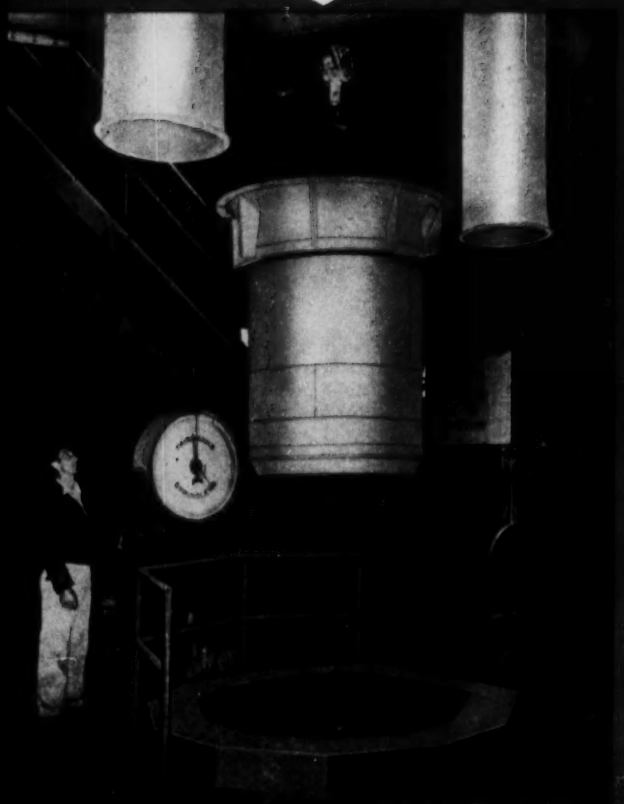
In operation today are Cleveland Tramrail installations that shuttle between two points delivering loads without need of operators — systems that dispatch materials to any of a large number of stations, as selected, empty and return, entirely automatically — equipment that is on the move all day long accumulating and delivering without any attendants whatsoever. The systems vary in type, size and complexity and have from one to hundreds of load-hauling carriers. They operate between points within a room, between floors of a building, outside between buildings, over roof tops and even over public highways.

TREMENDOUS SAVINGS

Automatic Tramrail systems enable tremendous savings — usually enough to completely pay for them within 12 to 18 months, or less — because they drastically reduce the man-hours required for materials handling and permit making the best use of building space. Widely separated operations can be integrated and carried out as though located adjacently. Remote areas, otherwise wasted, can be utilized efficiently.

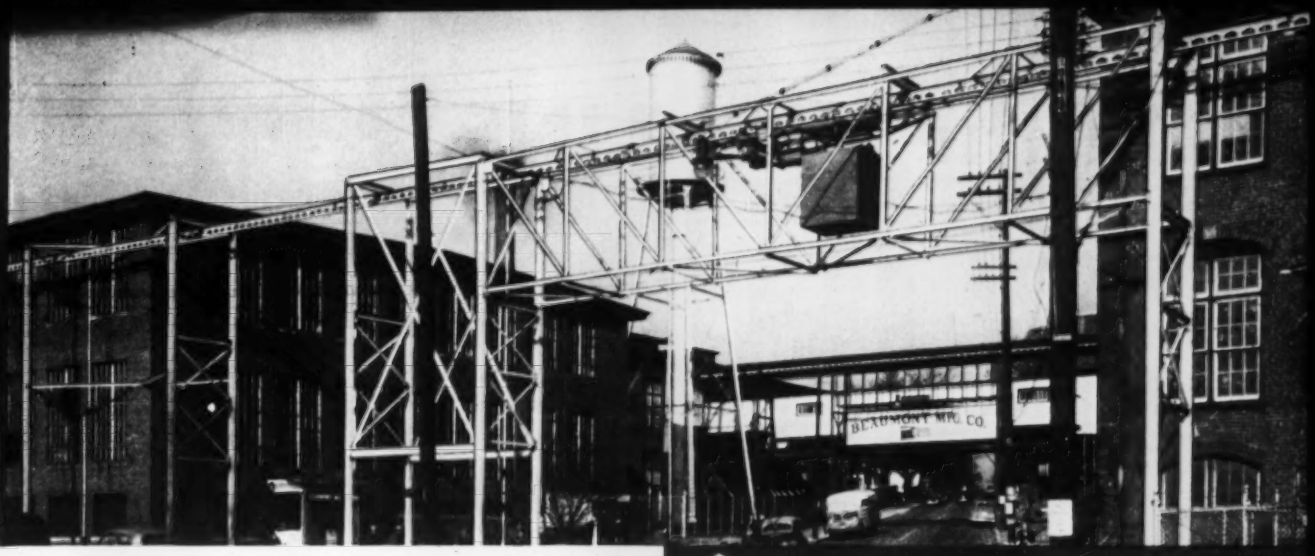
AUTOMATIC FURNACE CHARGING

Buckets with 2,000 lbs. of charge materials are delivered from weighing scale on one floor to melting furnace at an upper elevation, emptied and returned automatically by means of a Cleveland Tramrail Automatic Dispatch System.



AUTOMATIC TEXTILE BEAM HANDLING

80 man-hours are saved weekly by a Cleveland Tramrail Automatic Dispatch System which operates between two buildings, delivering beams directly from warpers to slashers without anyone accompanying.



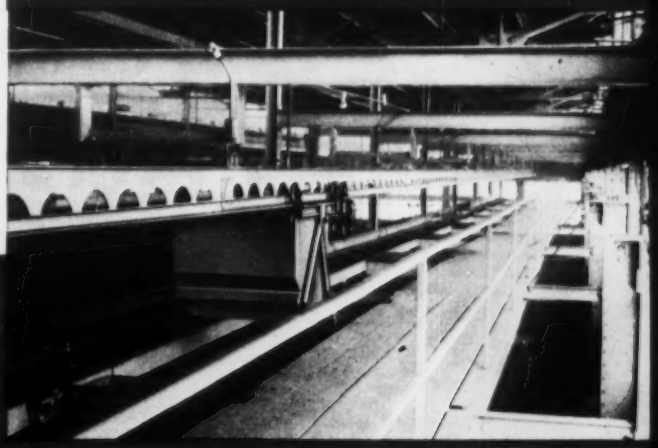
AUTOMATIC HANDLING OVER HIGHWAY

Materials are carried back and forth between buildings located on both sides of a principal thoroughfare by automatic dispatch carriers which operate on three Cleveland Tramrail track systems.

Floor traffic — and frequently materials storage — can be transferred to ceiling space and thus effect savings in floor area and facilitate handling.

Regardless of the nature of your business, most likely the principles of automation can be profitably applied to the handling of materials in your plant. With a wealth of experience in this field, Cleveland Tramrail engineers stand ready to serve you. Your inquiries are invited without obligation.

CLEVELAND TRAMRAIL DIVISION
THE CLEVELAND CRANE & ENGINEERING CO.
7886 EAST 284th ST., WICKLIFFE, OHIO



AUTOMATIC STEEL SCRAP DISPOSAL

One carload of metal chips is picked up daily and moved to a bin at a railroad track by an automatic magnet-carrying system. The scrap comes from metal-cutting machines on floor above. The system is in operation 12 hours a day without attendants.

AUTOMATIC SAND DISTRIBUTION

Sand is distributed in a foundry from the muller to molders' stations by a Cleveland Tramrail System which has a 24 cu. ft. bucket that travels on a double track and discharges wherever sand is called for.

AUTOMATIC PAPER SCRAP HANDLING

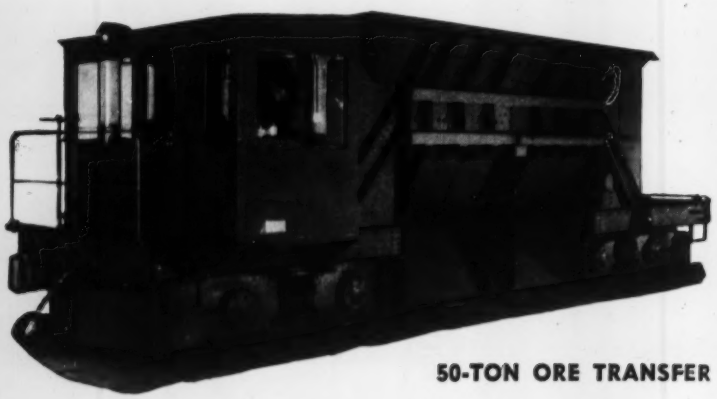
A carrier with two buckets delivers scrap paper cuttings from the first floor to 15 bins on the top floor. When the carrier reaches a pre-selected station it stops and bucket empties by turning. Carrier then proceeds to bin selected for second bucket. After it has emptied, carrier returns to starting point.

On the HIGHLINE

100-TON
ORE TRANSFER

It's ATLAS ORE TRANSFERS

It's Atlas Transfers for dependable, year-in, year-out service . . . for operator safety and convenience which approaches semi-automatic service.



50-TON ORE TRANSFER

This Atlas Ore Transfer is equipped with modern hydraulically-operated discharge gates and brakes. Steel plate trucks are provided. The cab is overhung at one side to give the operator a line of vision alongside the car. The car is equipped with electrically heated hoppers.

THE ATLAS CAR & MFG. CO.

ENGINEERS MANUFACTURERS

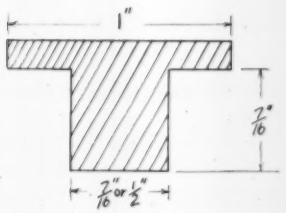
1140 IVANHOE RD. CLEVELAND 10, OHIO, U. S. A.

LETTERS
TO THE EDITORS

Hunts for Bar Stock

I require bar stock of a size shown in the cross-section view below. Which company makes such sections or where can I get such information?

W. W. Hart
6 Havens St.
Valley Falls, R. I.



• *We know of no company which rolls the size of the unequal tee you want. However, a number of companies roll special shapes of bars, and we suggest you contact one or more of them. Among those companies are: Atlantic Steel Co., Atlanta; Bethlehem Steel Co., Bethlehem, Pa.; Franklin Steel Division, Borg-Warner Corp., Franklin, Pa.; Jones & Laughlin Steel Corp., Pittsburgh 30; McInnes Steel Co., Corry, Pa.; Republic Steel Corp., Cleveland 1; Tennessee Coal & Iron Division, U. S. Steel Corp., Fairfield, Ala.; and U. S. Steel Corp., Pittsburgh 30.—ED.*

How's Your Thyratron?

On p. 103 of the Nov. 1 issue there appears a short story concerning the testing of old thyratrons, "New Life for Old Thyratrons" (Since the tester shows exact control characteristics of a tube, it has been possible to check the large stock of questionable tubes . . .).

We are interested in getting additional data on setting up such a tester. Perhaps you can give us the name of the party at Ryan Aeronautical Co. whom we can contact to get this additional information.

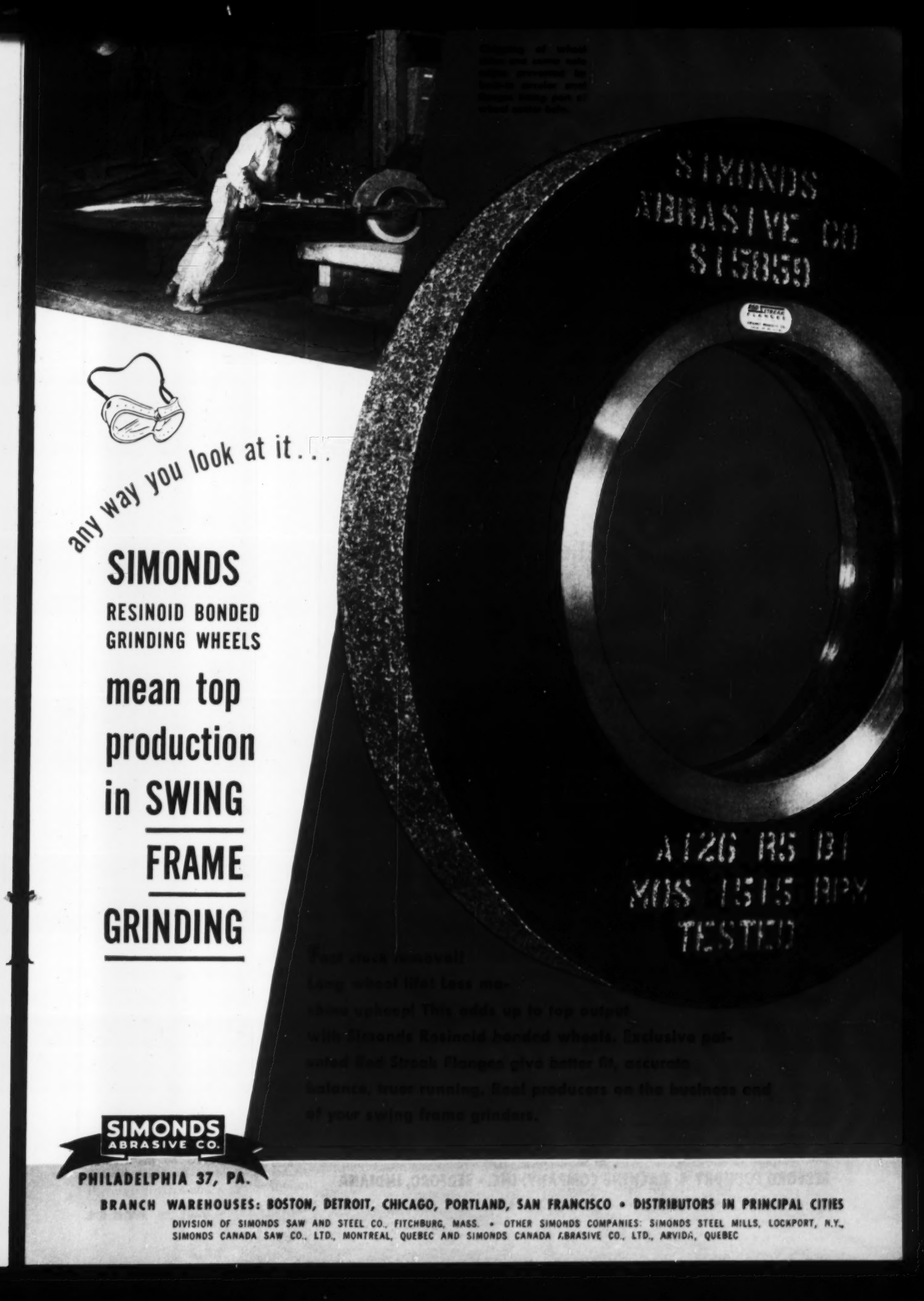
H. S. Beetham
purchasing agent
Northwest Metal Products Inc.
Seattle

• *Write to Mr. William Brotherton, Public Relations Department, Ryan Aeronautical Co., San Diego, Calif.—ED.*

Verifying Auto Survey

You published a provocative article in your Oct. 11 issue on p. 67, "Are You Paying Too Much for Auto Expenses?" The information furnished is excellent but without an indication of the size of the sample (the number of firms surveyed and the number of

(Please turn to page 12)



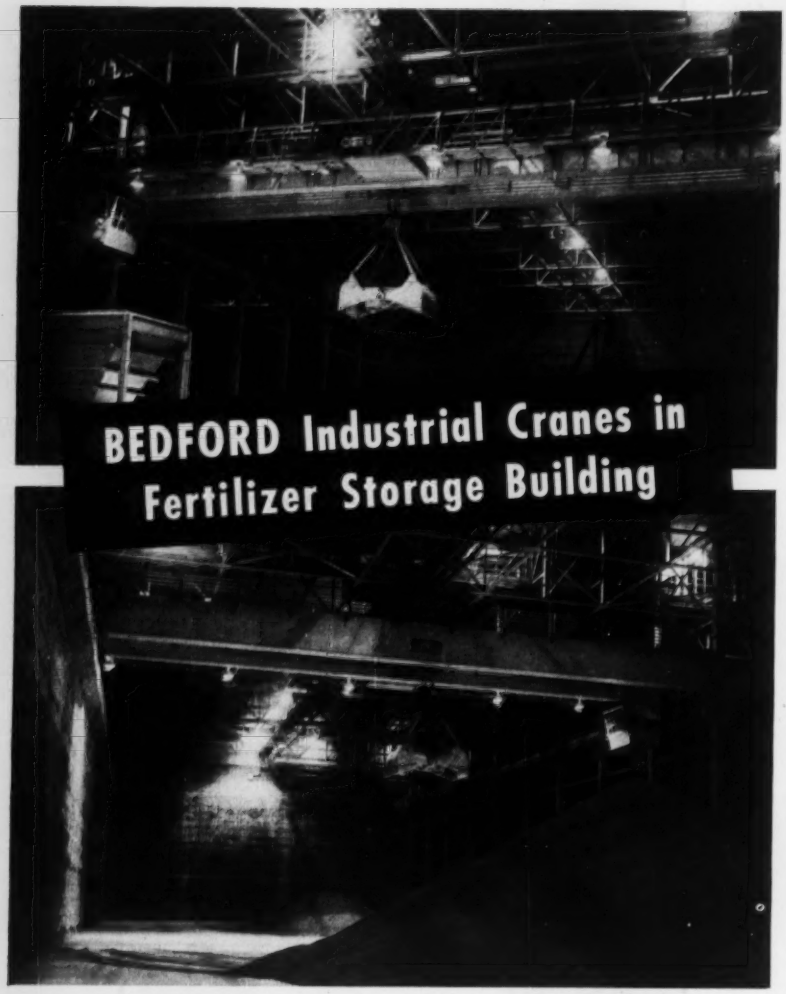
any way you look at it . . .

SIMONDS
RESINOID BONDED GRINDING WHEELS
mean top production in SWING FRAME GRINDING

SIMONDS ABRASIVE CO.
PHILADELPHIA 37, PA.

BRANCH WAREHOUSES: BOSTON, DETROIT, CHICAGO, PORTLAND, SAN FRANCISCO • DISTRIBUTORS IN PRINCIPAL CITIES

DIVISION OF SIMONDS SAW AND STEEL CO., FITCHBURG, MASS. • OTHER SIMONDS COMPANIES: SIMONDS STEEL MILLS, LOCKPORT, N.Y., SIMONDS CANADA SAW CO., LTD., MONTREAL, QUEBEC AND SIMONDS CANADA ABRASIVE CO., LTD., ARVIDA, QUEBEC



Two 10-ton Bedford Industrial type Bucket Cranes in the storage room at Nitrogen Division of Allied Chemical & Dye Corporation's South Point, Ohio, plant.

Throughout industry important companies are installing Bedford industrial type cranes to cut material handling costs on the *big* jobs.

Typical is the installation illustrated where two 10-ton Bedford Cranes on parallel runways service a 50,000 ton storage area.

Available in sizes from 5 tons to 350 tons for all kinds of service . . . each Bedford Crane is individually engineered for its specific job. Modern equipment plus advanced methods result in custom quality at production prices.

Why not consult a Bedford engineer on your next crane problem? Learn how you too can profit from Bedford's 52 years of specialized crane application experience.

(Write for complete catalog describing Bedford Cranes in detail.)

New York Office: 280 Madison Avenue
New York 16, N. Y., Phone MUrray Hill 5-0233

Pittsburgh Office: Oliver Building, Room 1241
Phone ATlantic 1-0136

ENGINEERED CRANES BEDFORD

BEDFORD FOUNDRY & MACHINE COMPANY, INC. · BEDFORD, INDIANA

LETTERS

(Concluded from page 10)

units operated) we are unable to draw any conclusions.

You state that much of the material in the article is based on a survey conducted by the Dartnell Corp., Chicago. Will you please advise how we may obtain a copy of that survey? If the survey is not available, possibly you can tell us how many firms were surveyed, the total number of units operated, and the number of units which are salesman-owned, company-owned, combination plan, and leased.

J. C. Walker
assistant to the president
Larkin Packer Co. Inc.
St. Louis

• *Copies of the current report by Dartnell are available and may be obtained by writing: Dartnell Corp., 4660 Ravenswood Ave., Chicago 40. From that latest report: "Over 350 companies, with fleet operations aggregating more than one million business miles a year, and spanning the nation from coast to coast, have contributed to this survey of business car and light truck practices and methods. A total of 52,809 vehicles engaged in a broad range of industrial, commercial, sales, utilities and related activities covering 934,345 miles of highway under all types of conditions and in all kinds of weather provide the basis for this report."—ED.*

Wants Closer Look

We would like to get the catalog and prices for the Clark Equipment Co. tractors pictured on p. 52 of the Oct. 4 issue.

J. Filner, manager
North Liberty Steel & Metals Corp.
Greenville, Pa.

• *Write to Clark Equipment Co., Buchanan, Mich.—ED.*

How Steel Is Priced

I am a senior at the U. S. Naval Academy and doing research on the subject of steel pricing . . . would you send me any information you have on the subject or sources where I may get information on it?

Midshipman Melvyn Fisher
U. S. Naval Academy
Annapolis, Md.

• *We are sending you a portion of* STEEL *in which base prices of steel are carried. There is a base price for each of the various forms of steel, such as sheets, bars, structurals and so forth. To the base price are added certain price extras to cover costs of processing and packaging. In addition to the base price and extras, the customer will pay all or part of the freight for delivery of the steel from the mill to his plant. You might find some help in the article, "Institutional Foundations of Pricing Policy in the Steel Industry," ("The Business History Review," Sept., 1954 issue, published by the Harvard Graduate School of Business Administration).—ED.*

The LS-8 at Grove City Municipal...

Shown here in the Grove City, Pa., Municipal Electric Plant is one of the Cooper-Bessemer LS-8 GDT engines. This operating side view, shows the unit's air-conditioning inlet manifold.

NEW is a good word to describe the air-conditioned Cooper-Bessemer LS-8 in operation at the Grove City, Pa., Municipal Electric Plant. Rated 1500 KW capacity at 80% power factor, this engine is an outstanding improvement over previous LS-8's which were rated 1250 KW.

This KW increase results, in part, from vapor injection —actually, air-conditioning built into the air intake manifold. No need to pre-cool the air before the supercharger . . . only a standard after-cooler installed between the supercharger and the air inlet manifold. Water, sprayed into the manifold at the rate of five gallons per minute, humidifies and further cools the air before it enters the engine cylinders. Excess water is removed from the air through baffles and a drain off.

Once again, Cooper-Bessemer offers a new approach to increased power output. For higher efficiency and reduced cost, it will pay you to contact the nearest Cooper-Bessemer office for additional information.

MOUNT VERNON, OHIO

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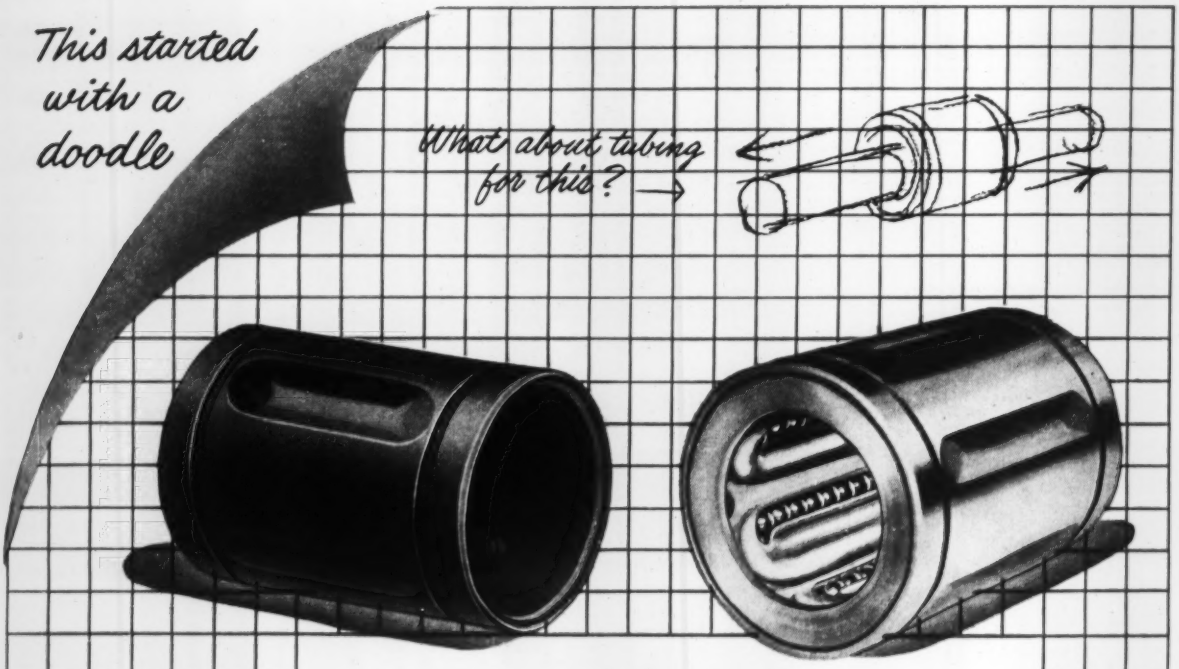
GROVE CITY, PENNA.

New York City • Seattle, Wash. • Bradford, Pa. • Chicago, Ill. Houston, Dallas, Greggton, Pampa and Odessa, Texas Washington, D. C. • Shreveport, La. • San Francisco, Los Angeles, Calif. • St. Louis, Mo. • Gloucester, Mass. • New Orleans, La. • Tulsa, Okla. • Cooper-Bessemer of Canada Ltd., Edmonton, Alberta—Halifax, Nova Scotia.

This started with a doodle

What about tubing for this? →



Precision Tubing for Precision Jobs

Tubing tolerance is a big "must" on this job. Thomson Industries, Manhasset, N.Y., insists on it. Otherwise, manufacturing BALL BUSHINGS (ball bearings for linear motion) would have been even tougher than it was.

Part of the problem was the tubing to house the bearings and the raceway. Those bearings are very tough on tubing . . . especially at the contact points.

Other requirements were: good surface conditions; good dimensional control, both I.D. and O.D.; uniform wall thickness; uniform concentricity; and uniformity from a metallurgical standpoint to stand heat treating.

And, equally important, economy. By using ELECTRUNITE Tubing, Thomson Industries eliminates a grinding operation. That helps keep costs down.

The tubing that has all these advantages is Republic ELECTRUNITE, a *precision* mechanical tubing for applications like this. You can get it in carbon or stainless analyses. And Republic engineers will be glad to help you use it, profitably, in whatever products you make. Call your nearest Republic Sales Office or write to:

REPUBLIC STEEL CORPORATION
Steel and Tubes Division
253 East 131st Street, Cleveland 8, Ohio
GENERAL OFFICES • CLEVELAND 1, OHIO
Export Department: Chrysler Building, New York 17, New York

REPUBLIC STEEL
ELECTRUNITE TUBING

This is a plain Ruff-L-Buff after wearing off about one inch in testing operations and then trimming. Loose threads, broken material and numerous small holes due to excessive heat and abrasion of the cloth are apparent.

30% LONGER BUFF LIFE

The Binderized Ruff-L-Buff shown here was subjected to the identical test undergone by the untreated buff... yet look at the difference! Notice the absence of thread or cloth breakage of any kind, proof of Binderizing's effect on buff life.

with New H-VW-M Binderized* Ruff-L-Buffs®

Not just "another type of buff", but a revolutionary new H-VW-M process which impregnates the entire Ruff-L-Buff with the same organic binder used in buffing compounds. From these new "Binderized" Ruff-L-Buffs come a host of practical, cost-cutting advantages, proved over many months in actual production line operations.

Item by item, these are the six major advantages of the H-VW-M Binderized Ruff-L-Buff.

- **Longer buff life** – damage from overheating eliminated by pre-lubrication of buffing material, preventing excess frictional heat caused by constant flexing. This additional buff life has averaged 30% in actual test runs.
- **Better compound adherence** – the binderizing impregnation creates an affinity between buff and compound. The compound does the cutting, not the buff.
- **Faster cutting action** – more compound is retained on the buff, insuring an even cut for a longer period without re-application of compound.
- **Extended composition life** – additional binder in the cloth ensures better abrasive adhesion, longer life of both composition and buff.
- **Heading-up time** – new wheels require only application of the compound to be ready for immediate operation.
- **Cooler running** – in addition to pre-lubrication, six holes in the center and twelve air channels in the center rim provide a forced air circulation over all cloth surfaces.**

And, of course, Binderized Ruff-L-Buff retain such important features as *bias-cut cloth* to prevent unravelling, *perfect buff balance* for uniform rotation and wear, and *exclusive Red-E-To-Use face* that takes compound without need for surface preparation.

H-VW-M bias-cut Sisalweev buffing wheels are also available in Binderized types.

* Patent Pending
** Patent No. 2,140,208

For complete information on H-VW-M Binderized Ruff-L-Buffs and other specialized buffs write for Bulletin No. B-102.

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Your H-VW-M combination—of the most modern testing and development laboratory—of over 80 years experience in every phase of plating and polishing — of a complete equipment, process and supply line for every need.

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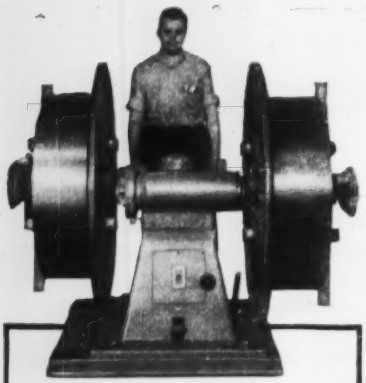
for continuous AUTOMATION

LITTELL Double Automatic Centering Reels



Production *continues* while you reload one side of this Littell No. 25-12 Double Reel. When one coil is used up the reserve coil swivels into feeding position in a matter of seconds. The idle side is reloaded while the working side pays out. Electric Brake with rheostat controls provide an adjustable spindle drag. The Reel Pedestal, mounted on a machined base plate, permits accurate line-up with the center of the die. No. 25-12 takes a 2500 pound coil on each side, and is one of the many Littell Automatic Centering Reels perfectly adapted to pressroom automation.

Write for the Littell Reel Catalog

Ask for your coil weight calculator

F. J. LITTELL MACHINE CO.

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TIME-SAVING IDEAS

Presented as a service to production men, we hope some of these interesting ideas, chosen from thousands of jobs, will suggest ways to help you cut time and costs in your own work.

AUTOMATIC LOADING GIVES PRODUCTION A BIG LIFT

Simplimatic lathe gets "Automation" assist

It wasn't the machining job itself. That's done with speed and precision on the Gisholt Simplimatic Automatic Lathe. But the real trick was getting the big, heavy workpieces on and off the machine. Slow, awkward handling was penalizing production. So this special handling equipment was devised.

The same basic tool setup is used to machine six different sizes of motor frames—with tools on two vertical slide housings doing finish facing, boring and chamfering at both ends of the housings.

push-button loading

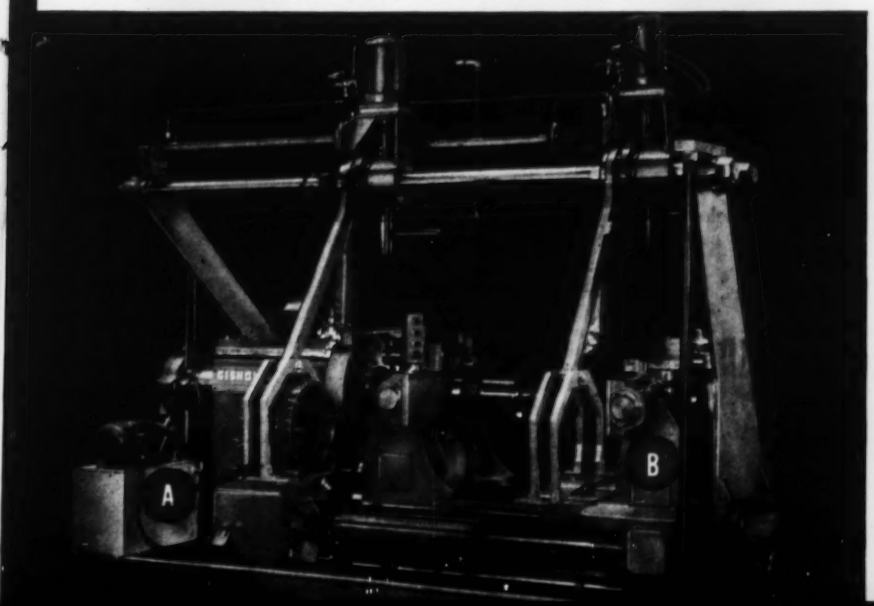
Note the special loading and unloading device. It works this way: Motor frames are slid from a conveyor onto loading cradle "A." At the push of a button, the frame swings in between the vertical slide housings and then moves longitudinally until it is over the expanding-type arbor, ready for chucking. A manually-moved locating stop positions the frame. After chucking, the loading cradle retracts, permitting the outer vertical slide housing to move in and support the mandrel during machining.

While the Simplimatic goes through its automatic cycle, the operator readies another part by re-loading the cradle. Unloading of the machined part is handled by the second cradle "B" which swings in between the housings and takes the frame as the mandrel releases. Floor to floor time for the largest frame is 3.5 minutes.

Changeover is fast. Removable guide rails are used in the cradles for locating and loading the frames. Different bore sizes are accommodated by removable shoe segments on the expanding mandrel. A crank arrangement repositions the outer slide housing for different frame sizes. Tool slides have micrometer-type adjustment screws with dial indicators for fast, accurate tool setting.

Faster loading and unloading of heavy parts with this special device increase productive time of the Simplimatic, lessen operator fatigue, cut costs. It is another example of the trend towards "automation."

Simplimatic Automatic Lathe with overhead-mounted hydraulic-operated loading/unloading device. Workpiece loads at cradle "A" and is unloaded on cradle "B."



Operator pushes button to start loading cradle into position to chuck part.

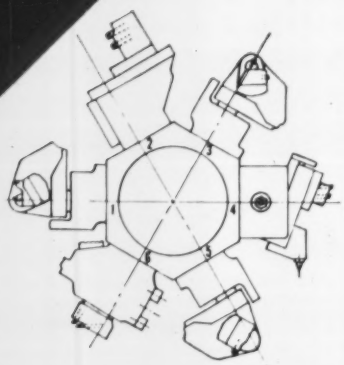
Workpiece being machined.

GISHOLT

TIME-SAVING IDEAS

SINGLE-TOOL WORK PUT "ON THE DOUBLE"

Unique Fastermatic setup generates radii with swinging tools

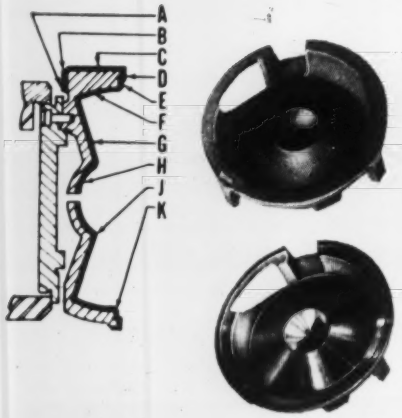


Only single-tool or generated cuts could achieve the accuracy and finish required for the seat faces and snap-fit diameters on these parts for water meter chambers. Note how the problem is solved by two Gisholt 1F Fastermatic Automatic Turret Lathes with a unique tooling setup. Nickel-iron workpieces come to the machines with reverse sides machined, drilled and bolted on chucking plates.

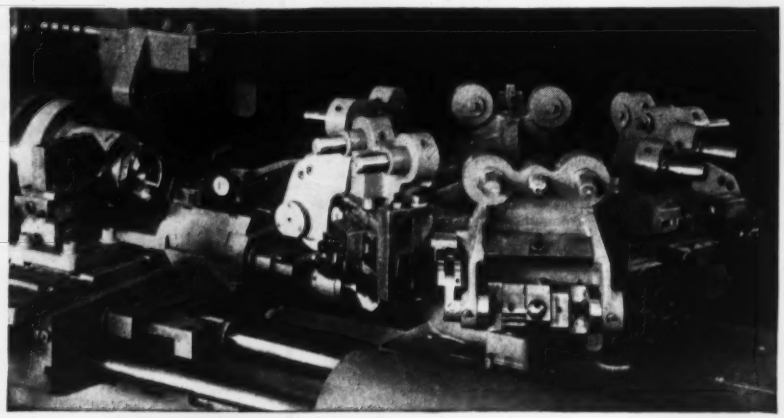
Here's the operational sequence:

Turret 1—Generate radii F and H.
Turret 2—Rough and finish turn C.
Turret 3—Burnish radius H and break corner K.
Turret 4—Finish face G and chamfer J with angular mounted slide tool and turret facing attachment.
Turret 5—Finish generate radius F.
Turret 6—Finish face D and E.
Front C/S—(Not shown on drawing)—Finish face A, semifinish face D and chamfer B.

One man and two Fastermatics with single-point tooling produce 320 parts per 8-hour day with this novel setup—12% better output than former way.



Special radius generating tooling on hexagon turret stations.



BALANCING AND CORRECTION COMBINED IN ONE HANDLING

Built-in Drill Spindle Speeds Output of Gisholt DYNETRIC Balancer

The design of the improved Gisholt 1SV1 Static Balancer easily permits the addition of correction equipment, such as drill spindles and welders. This makes production balancing simpler, faster and less expensive than ever.

Note how this well-known manufacturer is balancing flywheels. The cast iron parts are held on an expanding arbor and rotated. The operator notes the angle and amount of unbalance. The amount is indicated in terms of drill depth on the direct-reading meter located conveniently beside the work and the angular location is indicated by the number observed on a dial under a stroboscopic lamp.

Stopping the machine, the operator indexes the part for correction drilling at the location specified. Movement of the feed lever brings a thrust support under the workpiece and starts the drill. The vacuum chip remover comes down with the drill, removing the chips as they are formed. When the reading on the drill depth dial corresponds with the indicated amount of unbalance, the drilling is stopped.

In this efficient setup for measuring, locating and correcting unbalance in one chucking, output is at the rate of 53 parts per hour at 80% efficiency.

DYNETRIC BALANCERS GISHOLT

DEVELOPED JOINTLY WITH WESTINGHOUSE ELECTRIC CORPORATION. DYNETRIC—U. S. TRADE MARK REG. U. S. PAT. OFFICE BY WESTINGHOUSE ELECTRIC CORPORATION

Ask for information on courses offered by *Gisholt Balancing School.*

GISHOLT

NEW PROFITS...MODERNIZE NOW!

GISHOLT

TIME-SAVING IDEAS

CONTOUR BORING ON FIXED CENTER TURRET LATHE?

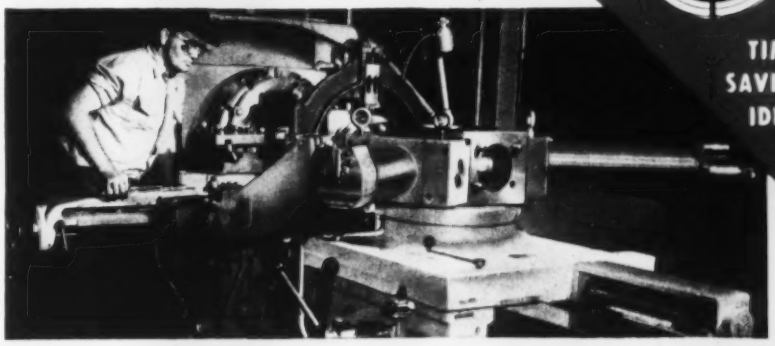
Special tooling and cam plate show the way

This workpiece is large, awkward and unwieldy. It's a gun recoil mechanism cradle assembly—28″ long by 19½″ in diameter.

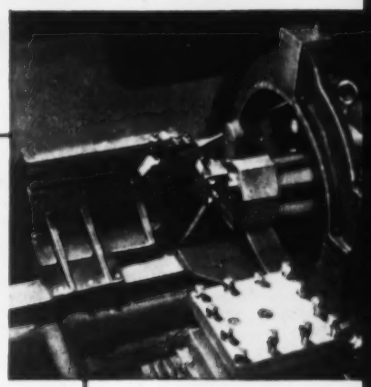
The job starts with the bore being chamfered from the square turret. A live center supports from the hexagon turret while square turret tools face the end and turn the O.D. Then a steadyrest is moved to support the part on the machined O.D. and the end is finish faced from the square turret.

Of special interest is the method for final contour boring achieved by a cam plate mounted on the rear bedway. A special trunnion, with one arm carrying the cam follower and the other carrying the boring bar and tool, pivots through the hexagon turret mounting. The boring tool alternately raises and lowers with the cam as the hexagon turret carriage feeds in toward the headstock.

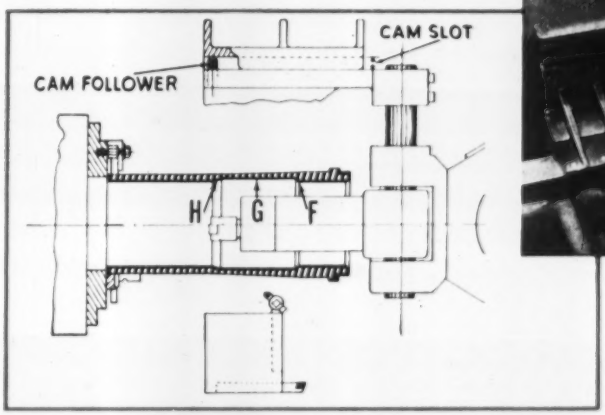
In this novel setup, accurate contour boring is easily accomplished by a cam-guided tool on this fixed center hexagon turret lathe.



Close-up shows angle plate on bedway and cam arrangement for guiding boring bar on fixed center turret lathe.

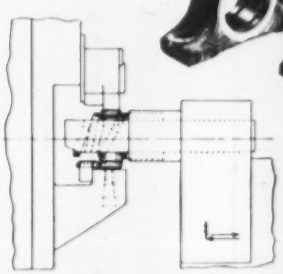


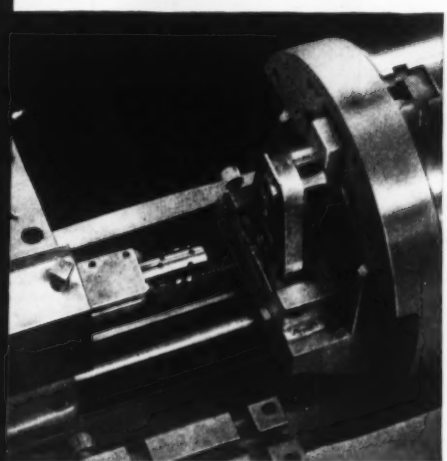
Contour F-G-H handled with special cam attachment. Other surfaces machined in conventional manner.



A FIRST-RATE JOB OF HOLDING AND MACHINING

Quick Changeover for Five Sizes Keynotes No. 12 Hydraulic Job





Single floating jaw in counter-balanced chucking fixture works for five sizes.

How to set up for simple, speedy machining and changeover for various size parts is nicely illustrated here.

This Gisholt No. 12 Hydraulic Automatic Lathe handles all production requirements for five sizes of cast iron pillow blocks. Holding is provided for by a special fixture mounted in a standard 3-jaw air chuck. Clamping pressure is applied to the feet, thus eliminating any distortion.

A single boring bar held in the front carriage does rough and finish boring and chamfering with longitudinal movement and then straddle faces, cuts snap ring grooves and chamfers with transverse movement. No tool marks left in the bore this way. Part sizes vary from 1.378″ to 2.440″ in the bore and time ranges from 1.3 to 1.9 minutes f.t.f.

Changeover is simple. For tooling, a new boring bar is added. For chucking, the centerline is changed with a riser plate. That's all there is to it.

A good example of how rough and finish machining of various size parts is speeded with separately tooled, easily changed boring bars.

GISHOLT

GISHOLT

TIME-SAVING IDEAS

3-IN-1 SETUP SAVES EXTRA OPERATIONS

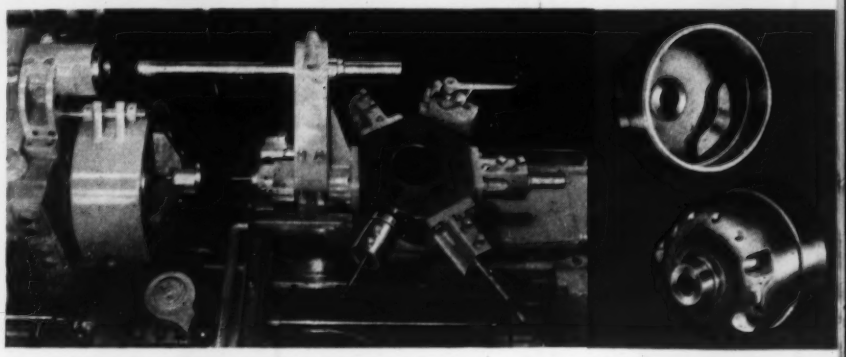
Machining, Broaching, Pressing Done on One Machine

Whenever you can combine three operations in one, you're time and money ahead. One such "how-to-do-it" is illustrated here... in the production of these fractional horsepower electric motor housings.

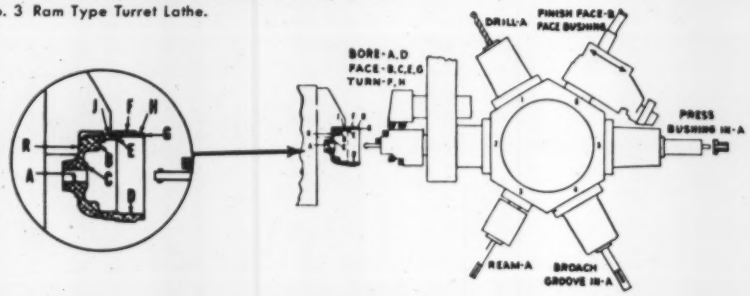
Instead of machining and then broaching a locking groove and then pressing in a bushing—as separate operations—this Gisholt No. 3 Ram Type Turret Lathe is expertly tooled to perform the *entire* job.

The layout shows how tools on the hexagon turret, in addition to standard machining, broach the groove and press in a bushing—all in one chucking. To complete the operation, the bushing and the housing are both finish faced from the last hexagon turret face. Time is only 1.37 minutes.

By skillfully doubling up operations on one machine, this producer eliminated a great deal of rehandling, saved real time and money in production.

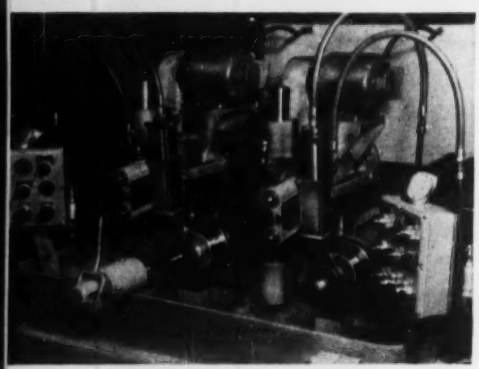


One machine does work of three with this setup on a No. 3 Ram Type Turret Lathe.



PARTS SUPERFINISHED AT RATE OF 140 PER HOUR

One operator tends two-spindle machine



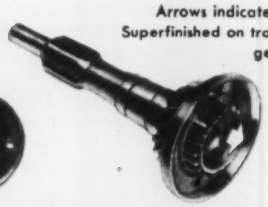
Showing setup of Gisholt Two-Spindle Superfinisher, with push-button control panels for each station.

This European manufacturer had the problem of Superfinishing four different transmission parts, including a gear and shaft assembly plus three similar gear parts as shown. The requirement was for high production and, naturally, for the most economical method.

The practical solution was worked out by Gisholt engineers using this No. 54 Two-Spindle High Production Superfinisher. Since both stations have a fully automatic machine cycle, only one operator is needed to load and unload parts, alternating between stations. Note that each station has its own separate push-button control panel so that after loading, the operator merely engages the cycle start button.

The left-hand spindle station is in continuous production on gear and shaft assemblies. The right-hand station has tooling setup changes for the 3 other gear parts. On all workpieces, Superfinish is performed on a 7 degree tapered surface on the back-rim I.D. Surface reading of from 25 to 30 micro-inches is reduced by Superfinishing to 4 micro-inches or less. With floor-to-floor time of only 35 seconds per part, total production is 140 parts per hour at 80% efficiency.

With this high-production setup, one machine and one operator handle a variety of parts to easily meet production requirements—and with real economy.



Arrows indicate surfaces Superfinished on transmission gear parts.

No. 11-1254

631

THE GISHOLT ROUND TABLE represents the collective experience of specialists in the machining, surface-finishing and balancing of round and partly round parts. Your problems are welcomed here.

GISHOLT

GISHOLT MACHINE COMPANY — Madison 10, Wisconsin

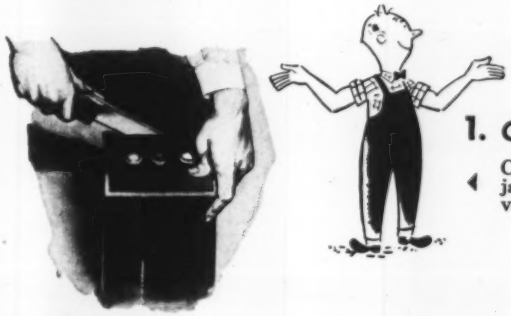
TURRET LATHES • AUTOMATIC LATHES • SUPERFINISHERS • BALANCERS • SPECIAL MACHINES

BATTERY MAINTENANCE TIP #2

from the GOULD Plus-Performance Plan

BEST WAY TO REMOVE ELEMENT FROM JAR

When accidental damage requires installing an element in a new jar, the element complete with cover must be removed. The Gould Plus-Performance Plan shows you how this can be accomplished easily and with safety.



1. *Cut Bond Between Cover and Jar*

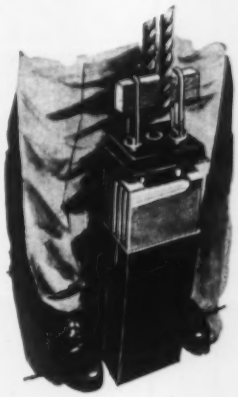
Cut the compound from around the top of jar, using warm compound knife, keeping it very close to inside of jar wall.

2. *Heat Outside of Jar Before Pulling*

To make sure there is no hardened compound to restrain the pulling of the element, heat the outside top of all four sides of the jar with a blow torch. Warm thoroughly, but do not melt or burn the jar.

3. *Pull Element from Jar*

Using Gould Jar Hold Down Clips (Part No. 2-1445) and Gould Cell Puller (Part No. 77061) as shown here, lift element halfway out of jar. Allow element to drain for minute or two, then remove and place immediately in new jar or lay it on flat insulated surface such as wood, for servicing.



GOULD Batteries

GOULD-NATIONAL BATTERIES, INC.
TRENTON 7, N. J.

For Railroad Air Conditioning and Lighting | For Mine Shuttle Cars and Locomotives | For Electric Industrial Trucks | For Diesel Locomotive Starting | For Standby and Emergency Power

©1954 Gould-National Batteries, Inc.

Always Use Gould-National Automobile and Truck Batteries

Here is one more example of how the Gould Plus-Performance Plan can help you save money by performing many service operations in your own shop. For the complete Plan, mail the coupon TODAY.

BATTERY INFORMATION HEADQUARTERS
Dept. S-114 Trenton 7, N. J.

Please send me, without charge or obligation, the Gould Plus-Performance Plan for _____ batteries.
(type or types)

Name _____

Firm _____

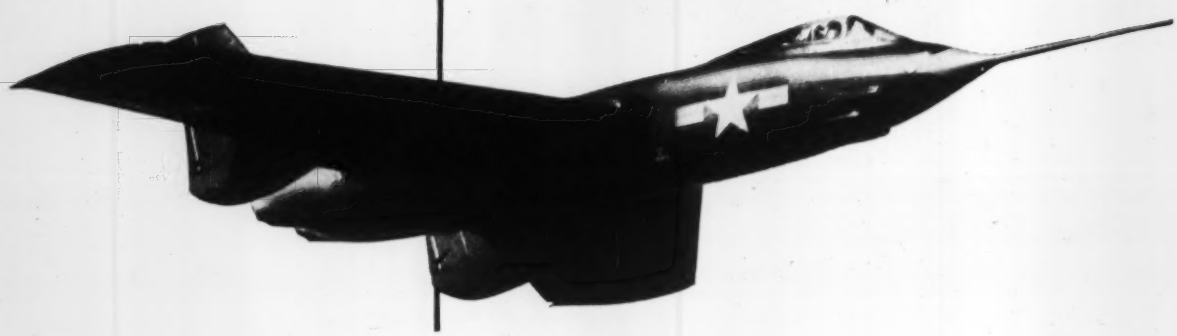
Address _____

City _____ Zone _____ State _____

For your selection

ALTEMP

HIGH TEMPERATURE SUPER ALLOY STEELS



ALTEMP A-286 . . . an austenitic iron-nickel-chromium alloy made heat-treatable by the addition of titanium. Designed to maintain high strength and corrosion-resistance up to the 1350 F range, and to afford satisfactory scale resistance up to 1800 F.

A-286 was developed in the A-L Research Laboratory in Watervliet, N.Y., in the 1949-51 period. Among the high-strength, heat-resisting alloys, it has exceptionally low strategic alloy content, improved hot-working and machining qualities, and good center ductility in large sections. Currently used in jet engines and superchargers for such applications as turbine wheels and blades, frames, casings, after-burner parts, bolting, etc.

This alloy is readily produced in large quantities without the need of special steel-making equipment. It is available in the form of billets, bars, forgings, sheet, strip, tubing and hot-extruded shapes. Certified laboratory data on the properties of ALTEMP grades are yours on request. Address Dept. S-592.

ALTEMP S-816 . . . a chromium-nickel-cobalt base alloy, strengthened by additions of molybdenum and tungsten, and with a columbium-carbon ratio of ten to one to insure its structural stability. Designed for high strength and corrosion-resistance service in the 1200-1500 F range, and at higher temperatures under lower stress conditions. Developed in the A-L Research Laboratory at Watervliet, N.Y. in the years of 1940-43, and engine-tested and proved for periods of over 30,000 hours.

S-816 is used currently for turbine blades in two of the production jet engines, also in a number of experimental aircraft and commercial gas turbines. Except for seamless drawn tubing, it is available in practically all forms and shapes in which stainless steels are processed, including hot extrusions.

ALTEMP S-590 was designed for service in the range of 1100-1400 F temperatures where high strength and corrosion resistance are required, and where cost is also a factor. Unlike S-816, which is practically a non-ferrous alloy, S-590 has a chromium-nickel-cobalt-iron base. However, it employs the same molybdenum and tungsten additives, and the same columbium-carbon ratio.

S-590 was developed at the Watervliet Laboratory and field-proved during the same years as S-816. It is available in the same shapes and forms, and is currently being used for turbine blades and wheels in experimental commercial gas turbines.

OTHER SUPER ALLOYS

Among the many other Super Alloys made by Allegheny Ludlum are V-36, M-252, 19-9 DL, 19-9 DX and Waspaloy.

Perhaps you have a high temperature problem where the use of an ALTEMP Super Alloy Steel may offer a solution. The services and experience of our Research Laboratories and Technical Staff are completely at your command. ***Allegheny Ludlum Steel Corporation, Oliver Building, Pittsburgh 22, Pa.***

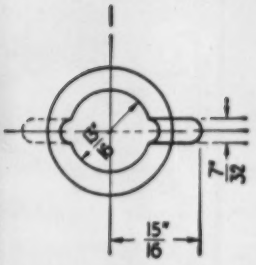
AL® LEADING PRODUCER HIGH-ALLOY STEELS

PIONEERING on the Horizons of Steel

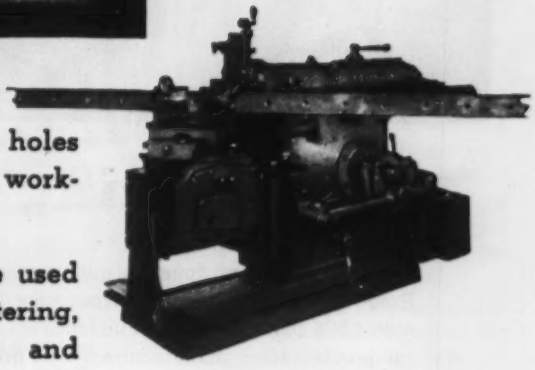
Allegheny Ludlum

WSD 8310A

MANUFACTURING at low cost with a Cincinnati Shaper



Photos courtesy The Ohio Knife Co., Cincinnati, Ohio.



Knives are high carbon, high chrome steel. Cutting tool is high-speed steel. Shaper operates at 119 strokes per minute.

This Cincinnati Shaper notches plow-bolt holes in these shear knives every five minutes, working two shifts, full time.

Shapers at The Ohio Knife Company are used strictly as manufacturing tools, for mitering, contour cutting, slotting, corrugating and beveling knife blades.

The setups for all these operations are simple, rapid and inexpensive—and a low manufacturing cost results.

Write for Shaper Catalog N-6.

CINCINNATI

THE CINCINNATI SHAPER CO.

CINCINNATI 25, OHIO, U.S.A. · SHAPERS • SHEARS • BRAKES

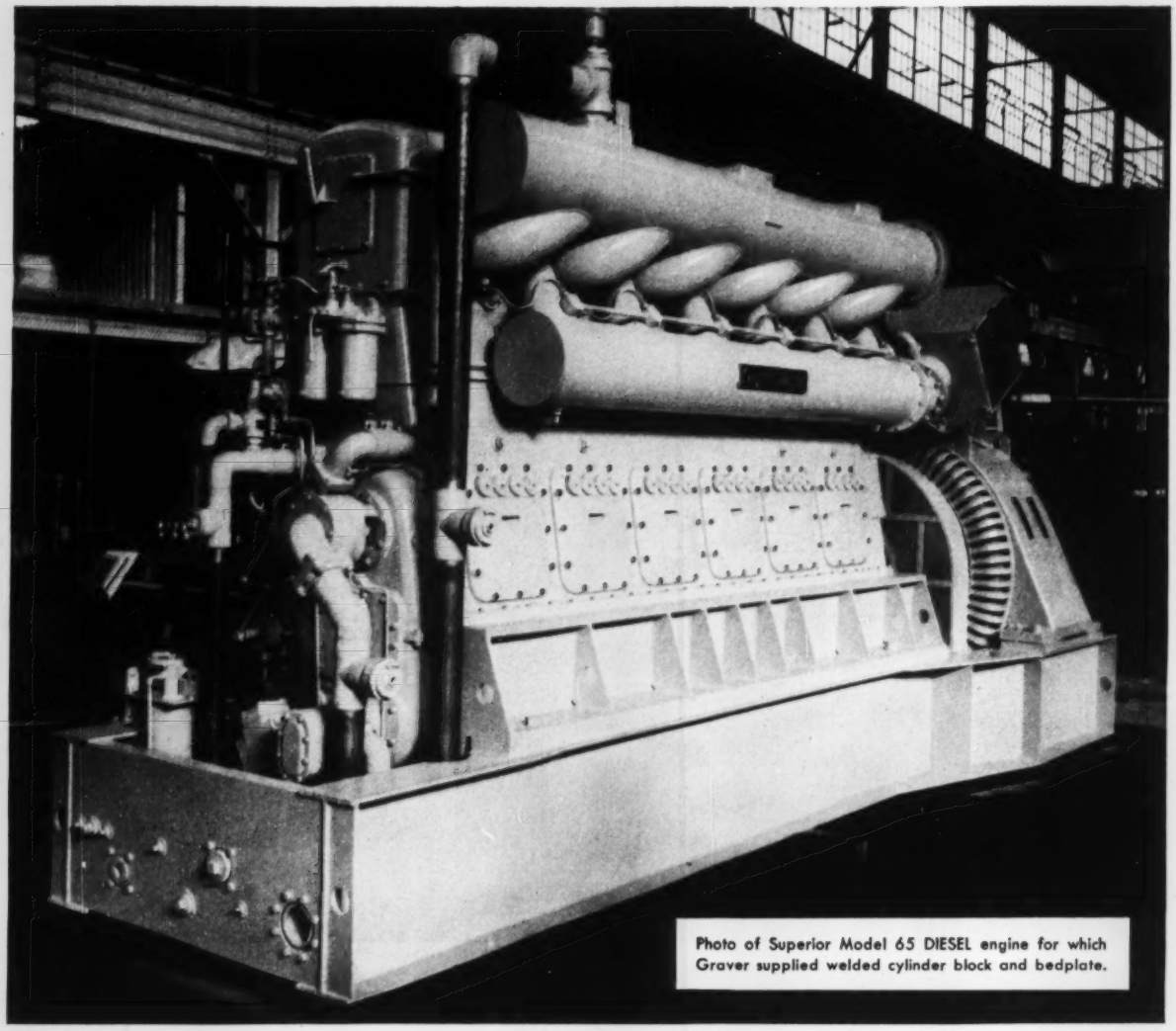


Photo of Superior Model 65 DIESEL engine for which Graver supplied welded cylinder block and bedplate.

Matching your standards!

When all is said and done, it's quality that counts! Proof of Graver's quality performance in weldments is a customer list that includes many of the same outstanding manufacturers who first called on Graver decades ago.

Graver craftsmen are versatile...competent to weld under *any* code restrictions. Graver's Weldery meets ASME standards, Navy, Hartford Steam Boiler Inspection Service, and AAR standards. Graver will meet or surpass *your* most exacting standards.

In addition, complete inspection techniques and stress-relieving facilities enable Graver to tackle any size weldment—simple or complex, and still maintain top quality. Graver handles weldments as large as 50 tons.

WRITE TODAY FOR COMPLIMENTARY ILLUSTRATED BROCHURE: "WELDMENTS."

GRAVER TANK & MFG. CO., INC.

EAST CHICAGO, INDIANA

CHICAGO • NEW YORK • PHILADELPHIA • EDGE MOOR, DEL. • ATLANTA • CATASAUQUA, PA. • PITTSBURGH • CLEVELAND • DETROIT • TULSA • SAND SPRINGS, OKLA. • HOUSTON • ODESSA, TEXAS • CASPER, WYO. • LOS ANGELES • FONTANA, CAL. • SAN FRANCISCO

GRAVER *source for quality weldments*

CUT COSTS with the Fastest Carburizing (AND CASE HARDENING)

PRODUCTION UP 350% IN 45% Less Floor Space!

Bearing races and thrust washers are carburized 0.065" case depth in 6 hours at 1700°F in two Ajax salt bath carburizing and tempering lines totaling 6 furnaces, and occupying 45% less space than 21 separate batch type furnaces previously used. Six men handle 3½ times as many races as were previously handled by twelve men.

Costs Cut 60%!

390 pounds of metal body screws per hour are case hardened (0.004" to 0.010") in a single Ajax salt bath furnace no larger than your desk. Bath working dimensions are 36" by 12" by 16". Only 15 to 35 minutes immersion at 1600°F are required — depending on desired case depth. Salt bath carburizing greatly reduced rejects and eliminated a pickling operation.

Tractor drive pinions are selectively carburized in this typical Ajax electric salt bath installation. By immersing only the gear in the bath, carburization is obtained where desired and the unheated portions remain unaffected.

Ajax electric salt bath liquid carburizing is the **fastest**, most **economical** method of producing a specified case depth.

Faster Heating . . . Closer Control—A closely controlled case of 0.040" can readily be produced in 2 hours at 1750°F.

Low Costs—*First cost is only 1/2 to 1/5 that of any other production carburizing system!* Much less floor is needed. Maintenance costs are low.

Less Distortion — Temperature uniformity (within 5°F) minimizes distortion . . . assures less finish grinding . . . permits more shallow case depths.

Extreme Flexibility and Simplicity—Several batches may be case hardened simultaneously —each to a different case depth.

Combines with Other Operations — Both carburizing and brazing can be done in one heating of the work. Carburizing can also be combined with martempering.

No "oxygenation" of the case —No pitting and spalling.

Selective Carburizing Simplified —Immerse only the portions of work to be treated, or copper plate the areas that do not require carburizing.

Eliminates Usual Reheating Operation—Work is quenched directly from carburizing bath.

Write for Catalog 116B and documented case histories of carburizing installations.

Send Your sample parts to the Ajax Metallurgical Service Laboratory for processing. No cost or obligation.

COMBINATION CARBURIZING-MARTEMPERING Saves 35%!

One operator runs a mechanized Ajax line that carburizes and martempers 65 outboard motor crankshafts per hour. Case depth of 0.040" is quickly obtained in a 1760°F bath. Besides an over-all savings of 35%, a copper plating operation and a straightening operation were eliminated. Rejects averaging 4% previously were practically eliminated.

Selectively CARBURIZED AND MARTEMPERED!

Only the teeth and internal spline of this AMS6260 gear are carburized to a 0.035 inch case with a 4½-5 hour immersion. Copper plating of the balance of the piece inhibits carburization. After carburizing and air cooling, gear is reheated and martempered at 500°F for 3½ minutes. Final hardness is Rc 62/63.

AJAX HULTGREN electric SALT BATH furnaces

Trademark

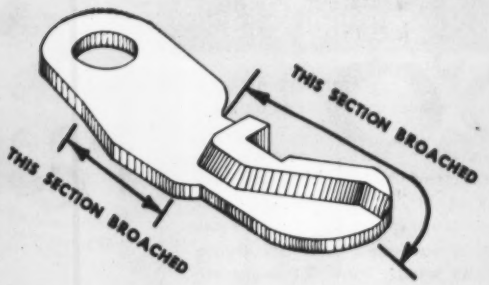
World's largest manufacturer of electric heat-treating furnaces exclusively

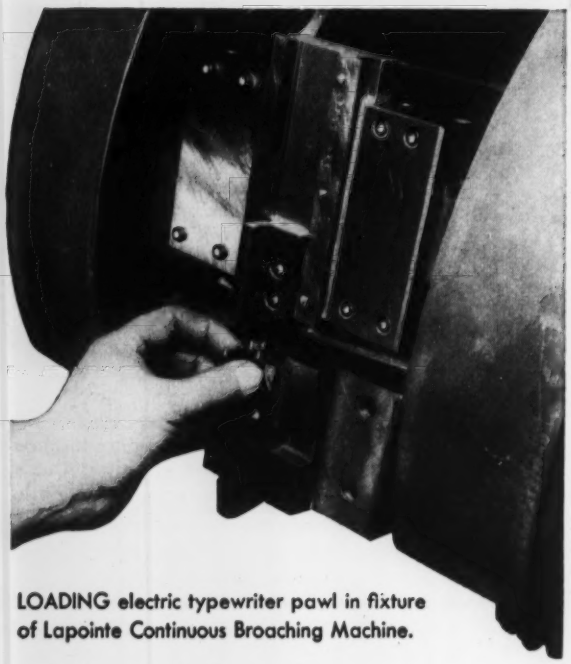
AJAX ELECTRIC COMPANY 952 Frankford Ave., Philadelphia 23, Pa.

Associated Companies: Ajax Electric Furnace Corp. • Ajax Electrothermic Corp. • Ajax Engineering Corp.

here's a good example of what can be done by LAPOINTE CONTINUOUS BROACHING

(TWICE SIZE)





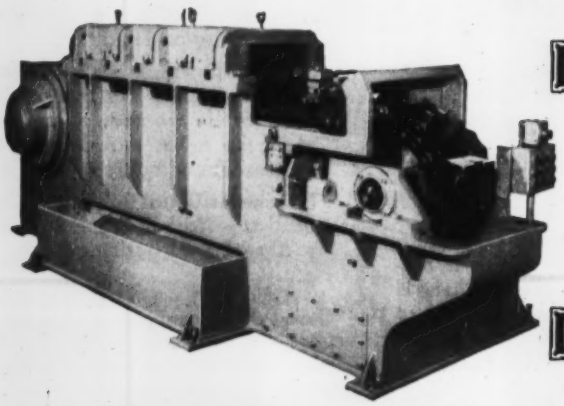
LOADING electric typewriter pawl in fixture of Lapointe Continuous Broaching Machine.

electric typewriter pawl

Contours broached on opposite sides simultaneously, leaving *machined surfaces* of fine finish . . . and to precision tolerances . . . *at a production rate of 800 and more per hour!* This is high production for so small a part, so awkward to load.

THINK of the parts, small or large, that you may now be machining by less economical methods. Then send for the new Lapointe **Bulletin CH-3** and learn more about the superior features of the Lapointe Continuous Broaching Machine. Here are a few:

- Massive, sturdy construction.
- Extra rigidity results in remarkably smooth operation, with no evidence of vibration.
- Full electric interlock instantly stops machine if parts are improperly loaded or clamped.
- Shear pin will sever and protect tools if undue strain develops, or if any other evidence of malfunctioning appears. (Pin is easily accessible, on outside of machine.)
- Drive sprockets are made in pie-shaped segments, removable one at a time, making complete replacement possible — if necessary — without removing drive chain or fixtures from the machine.



LAPOINTE **CONTINUOUS BROACHING MACHINE**
Available in 4 standard sizes
10 hp. 42-inch stroke
20 hp. 66-inch stroke
30 hp. 90-inch stroke
40 hp. 120-inch stroke

Any desired combination of horsepower, stroke, and speed can be obtained.

LAPOINTE **BUILDS THE MACHINE**
BUILDS THE FIXTURES
AND MAKES THE TOOLS

Lapointe takes <u>all</u> the responsibility for your CONTINUOUS BROACHING program!

THE LAPOINTE MACHINE TOOL COMPANY

HUDSON, MASSACHUSETTS • U. S. A.

In England: Watford, Hertfordshire

THE WORLD'S OLDEST AND LARGEST MANUFACTURERS OF BROACHING MACHINES AND BROACHES

CALENDAR
OF MEETINGS

November 23-December 3, American Society of Mechanical Engineers: Annual meeting, Statler hotel, New York. Society address: 29 W. 39th St., New York. Secretary: C. E. Davies.

November 29-December 2, First International Automation Exposition: 244th Regiment Artillery Armory, New York. Information: Richard Rimbach, 845 Ridge Ave., Pittsburgh 12.

December 1-3, American Institute of Mining & Metallurgical Engineers: Electric furnace steel conference, William Penn hotel, Pittsburgh. Institute address: 29 W. 39th St., New York 18. Secretary: E. H. Robie.

December 1-3, National Association of Manufacturers: Annual meeting. Waldorf-Astoria, New York. Association address: 2 E. 48th St., New York. Secretary: Noel Sargent.

December 2-7, National Exposition of Power & Mechanical Engineering: Commercial Museum, Philadelphia. Information: International Exposition Co., 480 Lexington Ave., New York 17. Manager: E. K. Stevens.

December 5-7, National Association of Aluminum Distributors: Annual meeting, Boca Raton hotel and club, Boca Raton, Fla. Association address: 1900 Arch St., Philadelphia 3. Secretary: R. B. Wall.

December 5-9, Scientific Apparatus Makers Association: Fall meeting, Pinehurst hotel, Pinehurst, N. C. Association address: 20 N. Wacker Dr., Chicago. Executive vice president: Kenneth Andersen.

December 12-15, American Institute of Chemical Engineers: Annual meeting, Hotel Statler, New York. Institute address: 120 E. 41st St., New York 17. Secretary: Stephen L. Tyler.

December 13-14, Material Handling Institute Inc.: Annual meeting Statler hotel, New York. Institute address: 813 Clark Bldg., Pittsburgh 22. Managing director: R. Kennedy Hanson.

December 14-15, Industrial Truck Association: Annual meeting, Hotel Statler, New York. Association address: 526 Washington Loan & Trust Bldg., Washington 4. Secretary: William Van C. Brandt.

January 5-7, Institute of Scrap Iron & Steel Inc.: Annual convention, Saxony, San Souci, Sea Isle hotels, Miami Beach, Fla. Institute address: 1729 H St., N. W., Washington 6. Executive vice president: Edwin C. Barringer.

January 10-13, American Road Builders' Association: Annual meeting and exhibit, Roosevelt hotel, New Orleans. Association address: World Center Bldg., Washington 6. Executive vice president: Eugene Reybold.

January 10-14, Society of Automotive Engineers Inc.: Golden anniversary annual meeting, Sheraton-Cadillac and Statler hotels, Detroit. Society address: 29 W. 39th St., New York 18. Secretary: John A. C. Warner.

January 12, Aluminum Extruders Council: Winter meeting, Saxony hotel, Miami, Fla. Council address: 209 Washington St., Boston. Secretary: Phillip Lemelman.

January 12-14, Southern Industrial Distributors Association: Midyear meeting, Edgewater Gulf hotel, Biloxi, Miss. Association address: 208 Peachtree Arcade, Atlanta 3. Secretary: Ted Pugh.

January 13, National Constructors Association: Annual meeting, Hotel Plaza, New York. Association address: 50 E. 41st St., New York 17. Secretary: C. B. Bronson.

January 14-15, Machinery & Allied Products Institute: Economic conference, Mayflower hotel, Washington. Institute address: 1200 18th St., N.W., Washington 6. Secretary: Charles W. Stewart.

January 18-20, Caster & Floor Truck Manufacturers Association: Annual meeting, New Weston hotel, New York. Association address: 27 E. Monroe St., Chicago 3. Executive secretary: Harry P. Dolan.

January 19-20, Steel Shipping Container Institute Inc.: Winter meeting, Hampshire House, New York. Institute address: 600 Fifth Ave., New York 20. Secretary: L. B. Miller.

IN THE HEART OF INDUSTRIAL GROWTH

Newport Steel

ECONOMICAL WATERAIL DELIVERY

You find both economy and service in Newport Steel's location in the midst of today's greatest industrial development. From here great trucking lines fan out across the nation; here seven major railroads converge, and barges load for many points on the Mississippi-Ohio River system. Producing an ever-widening variety of quality steel on the most modern new facilities, Newport is in excellent position to meet your every specification in quality, dependability and prompt delivery. Let us tell you more about our ability to serve this area's expanding industry.

Newport Steel is situated on the Mississippi-Ohio River system and the great Cincinnati rail hub. With the advantage of location, new river barge facilities and seven major railroads, Newport gives economical, dependable delivery to industrial areas throughout the Middle West and South.

PRODUCTS OF NEWPORT STEEL

Hot-Rolled Steel in Coil
Hot-Rolled Pickled Steel in Coil
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Galvannealed Sheets
Colorbond Sheets
Hot-Rolled Pickled Sheets
Electrical Sheets
Alloy Sheets and Plates
Roofing and Siding
Eave Trough and Conductor Pipe
Culverts

COLD-ROLLED STEEL SHEETS soon available from new mill now nearing completion.

Newport Steel CORPORATION
NEWPORT, KENTUCKY

YOUR CONFIDENCE IS JUSTIFIED WHERE THIS FLAG FLIES

A SUBSIDIARY OF MERRITT-CHAPMAN & SCOTT CORPORATION

Carry the load via Link-Belt belt conveyors... SEE YOUR COSTS GO DOWN

LINK-BELT offers you the "total engineering" so necessary for top efficiency

DESIGNED FOR OVERALL EFFICIENCY

Because of its unrivalled experience, Link-Belt can do a better job of gathering and analyzing all data. Proposals reflect this understanding of the most practical way to fit conveyors into your overall system requirements.

BUILT FOR LONG-LIFE PERFORMANCE

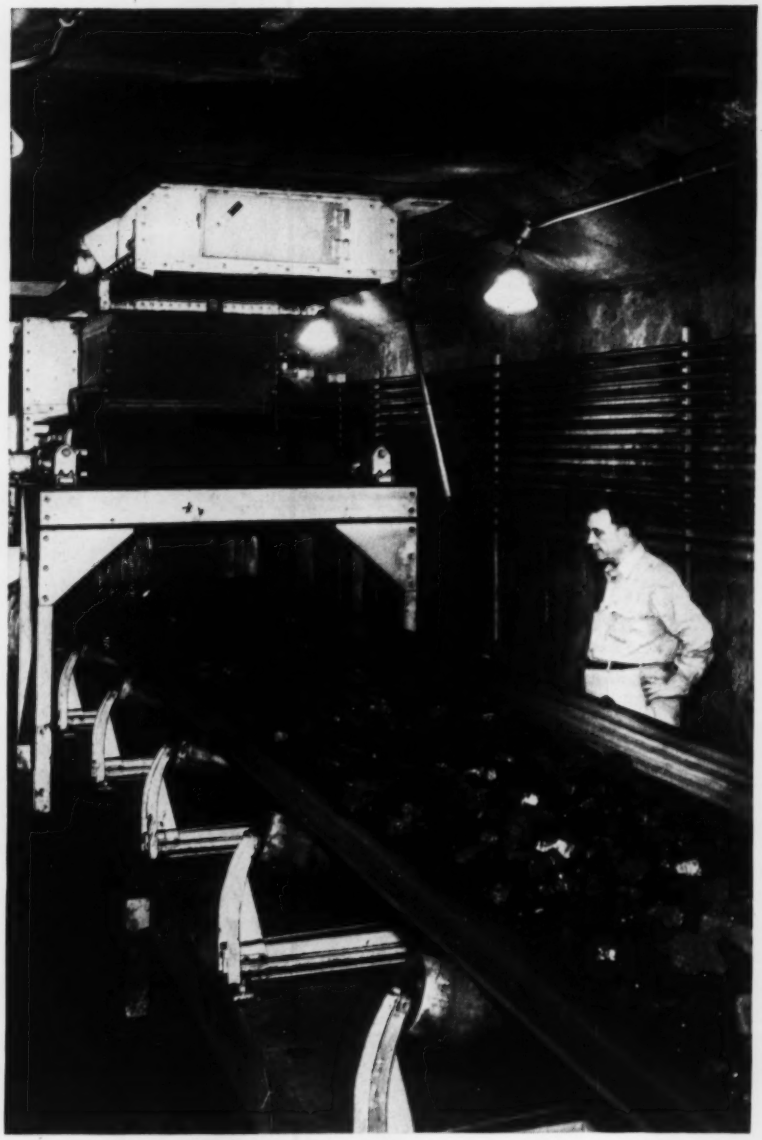
Link-Belt manufactures all components and related feeders and conveyors. You are assured of the right equipment because of this breadth of line. And Link-Belt will supply the highest grade belts engineered to the job.

DELIVERS FULL RATED CAPACITY

Link-Belt follows through on every detail of the job, including electrical controls and even wiring and foundations. What's more, Link-Belt will furnish experienced erection superintendents, staffs and skilled crews if desired.

ASSURE SATISFACTORY PERFORMANCE

When you rely on Link-Belt as a single source for your complete system, Link-Belt accepts responsibility for placing it in full operating readiness. We will also supervise modernization of existing systems.



Link-Belt 60-in. wide belt conveyor served by eight L-B 48-in. wide belt feeders, in reclaim tunnel under coal dock.

WHETHER it's a single belt conveyor or a complete system, there's no substitute for Link-Belt equipment and Link-Belt engineering. Call the district sales office near you for all the facts on this unique single-contract service.

LINK-BELT

BELT CONVEYOR EQUIPMENT

LINK-BELT COMPANY: Executive Offices, 307 N. Michigan Ave., Chicago 1. To Serve Industry There Are Link-Belt Plants and Sales Offices in All Principal Cities. Export Office, New York 7; Canada, Scarboro (Toronto 13); Australia, Marrickville, N.S.W.; South Africa, Springs. Representatives Throughout the World.

13,487

Roebling drum packs are shipped on pallets unless otherwise specified. This gives you today's easiest, least expensive method of moving and stacking wire — with a fork truck, one man can do the work of ten.

Packed to save you money!

IN ADDITION to producing top quality high carbon wire, Roebling has developed many special methods of packing ... and some *one* of these, or some other method which may be developed for your specific requirements, may save a considerable amount of time and money in your plant.

Certain types of wire, for instance, can be packed in hexagonal fibre drum packs that provide superior protection and facilitate handling and storing wire. Drum packs do not have to be returned ... save you bother, storage space and freight charges.

You *pay* for the best when you buy high carbon wire. Make sure you *get* the best, in wire and packing too. Always specify Roebling. John A. Roebling's Sons Corporation, Trenton 2, N. J.

ROEBLING CF&I

Subsidiary of The Colorado Fuel and Iron Corporation

ATLANTA, 934 AVON AVE • BOSTON, 51 SLEEPER ST & 5 PITTSBURGH ST • CHICAGO, 5525 W. ROOSEVELT RD • CINCINNATI, 3253 FREDONIA AVE • CLEVELAND, 13225 LAKEWOOD HEIGHTS BLVD. • DENVER, 4801 JACKSON ST • DETROIT, 915 FISHER BLDG • HOUSTON, 6216 NAVIGATION BLVD • LOS ANGELES, 5340 E. HARBOR ST • NEW YORK, 19 RECTOR ST • ODESSA, TEXAS, 1920 E. 2ND ST • PHILADELPHIA, 230 VINE ST • ROCHESTER, 1 FLINT ST • SAN FRANCISCO, 1740 17TH ST • SEATTLE, 900 1ST AVE S. • ST. LOUIS, 3001 DELMAR BLVD • TULSA, 321 N. CHEYENNE ST • EXPORT SALES OFFICE, TRENTON 2, N. J.

If you wish, Roebling spools will be delivered on pallets with separators, providing the easiest and most economical means of handling and stacking wire with fork truck.

"From welding studs to speaker bolts we get it fast from AMERICAN!"

On-time delivery is only part of the job here at American. Just as important to you is the price you pay for every fastener.

We don't pretend to be miracle men. But on many a job, we have been able to provide the happy combination of good delivery and a lower cost per unit.

Try us. Send us prints of your fasteners. Tell us how many you need. We'll do the rest, at no obligation to you.

To reduce your assembly costs, to avoid the "slips" that can ruin any fine finish . . . ask for prices of American Phillips Screws.

✕ *marks the spot*
. . . the mark of extra quality

AMERICAN SCREW CO.

PHILLIPS HEADquarters
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Plants at Willimantic, Conn. and at Norristown, Pa.
Warehouse and office at Chicago
Office, Detroit, Michigan

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Designers and Builders of Ferrous and Nonferrous Rolling Mills, Mill Rolls, Auxiliary Mill and Processing Equipment, Presses, and other Heavy Machinery. Manufacturers of Iron, Nodular Iron and Steel Castings, and Weldments.

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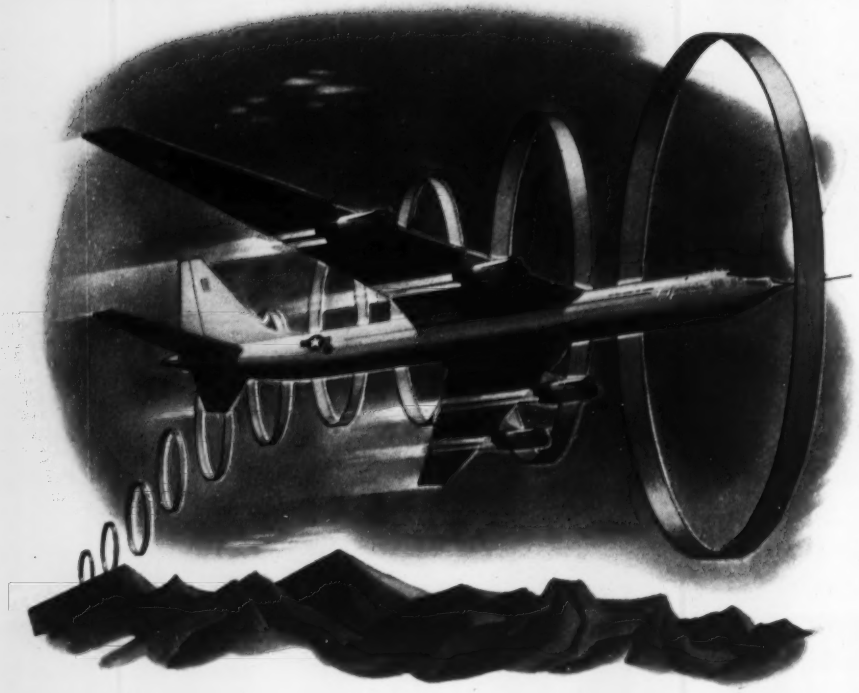
UNITED *can serve you no matter where in the world you are*



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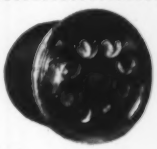
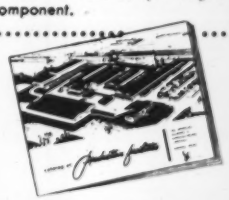


Armature Spiders
Weldment of six parts combining plate and bar stock.

Turbine Frame Assemblies
Formed sheet metal bands and flash butt-welded rings fabricated into a jet engine component.



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STEEL

November 22, 1954

Metalworking Outlook

AFL-CIO Merger: Far Along?

AFL-CIO merger plans may be further along than many people realize. Details revealed by William F. Schnitzler, AFL secretary-treasurer, indicate merger could be completed by as early as next summer. At the outset all existing affiliates would be taken into the united federation, as is. Later on, plans are for amalgamations of various internationals. Jurisdictional problems would be worked out first on a national level, then tailored to local conditions. One of the first effects of a merger would be the amalgamation of central union groups that the CIO and AFL maintain in many cities. Publications would also be combined.

More Labor-Management Accord

Here's another case where labor is co-operating with management: CIO auto workers at the Reo Motors Inc. plant in Lansing, Mich., will forego their 5-cent annual improvement factor increase until next July 1. Reo is going through ownership vicissitudes. It originally was going to transfer its truck assets to Henney Motor Co., Freeport, Ill., for $16.5 million. But early this month Reo and Henney announced that Bohn Aluminum & Brass Co. has been assigned the truck manufacturing facilities, which will be kept in Lansing.

Pension Funds Gain in Value

Pension trust funds have made substantial capital gains. Commerce Clearing House says the rising stock market prices have increased the average paid-in value of 49 company funds 25 per cent (to $7.8 million) as of June 30, 1954. The dividend yield, however, is not high. A CCH survey of 42 funds showed the yield averaged 3.67 per cent on the paid-in value, but only 3.55 per cent on the June 30 market value. That situation, combined with a further rise in the market since the survey, indicate that shifts in investments may be made. Administrative cost averaged only 0.2 per cent, largely because much of it is being absorbed by the employers.

Unemployment To Drop Further

Unemployment will continue to drop for at least another four months. New claims for jobless pay filed across the nation last month were 1,055,000. That's down nearly 40 per cent from the high point last January. The biggest employment increases are in steel and auto plants.

Farmer Income To Climb

Look for increased equipment buying by farmers in 1955. Farm income should be higher, to match the 4 or 5-per-cent increase expected in the economy generally. Although farmers are having a so-so year, there have been bright spots. The upward export trend which began in 1953 continues. So far this year shipments of farm products abroad are running 5 per cent higher than last year, and the outlook is for a further substan-

Technical Outlook—p. 91 Market Outlook—p. 131

tial increase in 1955. And Americans continue to set better and better tables. They're eating 13 per cent more food per person than prewar.

The 1954 Wage Story

The collective bargaining story of 1954 is practically written. It's a 5-cent hourly wage increase, plus a fraction of a cent for fringe benefits. Associated Industries of Cleveland reports that the weighted average increase of Cleveland area companies—who indicate the national pattern because of their diversity—is $0.053 an hour, excluding fringe benefits. In fringes, the trend is toward higher pension and insurance benefits and elimination or freezing of the tie-in between social security and negotiated plans.

A Toll from Toll Roads

Watch toll roads. Their mile-after-mile expansion means business for metalworking. In addition to 1200 miles in operation, about 900 miles of toll projects are under construction, most of which will be completed in 1955 and 1956. There are another 4700 miles specifically authorized. A further 2650 miles are in the planning stage now. Robert B. Murray, under secretary of commerce for transportation, believes that soon some 12,000 miles of toll roads will be operating in the U.S.

$10 Billion for Private Research

Private industry has spent more than $10 billion on scientific research since the war. Dr. Paul Schwarzkopf, president of American Electro Metal Corp., New York, says more than 5000 privately owned industrial organizations employ 250,000 scientists. Other observers believe the outlook is for more private companies doing research, more scientists employed, even more money spent.

Straws in the Wind

Kaiser Motors Corp. will dispose of its Detroit Engine Division and its Wilson Foundry Division at Pontiac, Mich., within the next four to six months; most equipment and all production will be moved to Toledo . . . Westinghouse Electric Corp.'s sales of electric heating units in the first half were running about 20 per cent ahead of the same period last year . . . General Motors Corp. is looking into potentialities of lightweight passenger trains . . . Union executives are trying to cook up ways to get city officials to stop home owners from doing-it-themselves . . . American Motors Corp. will use the Detroit Hudson plant to produce the Mighty Mite, a small jeep-type vehicle with an aluminum die cast engine; AMC bought Mighty Mite rights from Mid-America Research Corp., Wheatland, Pa.

This Week in Metalworking

Machine tool builders expect sales of $960 million in 1954 (p. 41) . . . As expected, the guaranteed annual wage will be the major demand of the United Auto Workers in 1955 (p. 43) . . . Thompson Products Inc. has a work simplification program that has saved it more than $2 million (p. 44) . . . Investment castings: Profile of a young industry (p. 46) . . . McLean Trucking Co. wants to haul truck trailers on specially designed ships along the Atlantic coast, a "fishyback" freight program to parallel the piggyback plan on railroads (p. 47).

Never Confuse the No. 8 MARVEL with an ordinary Band Saw

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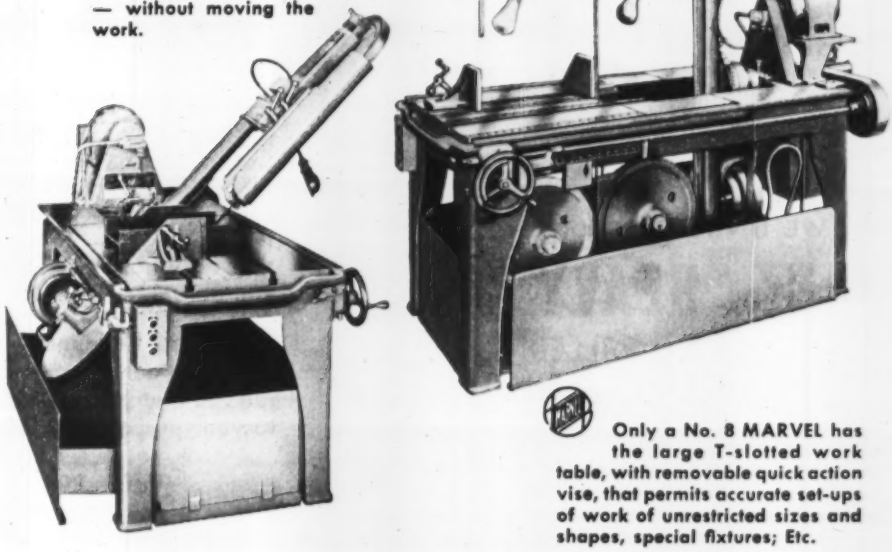

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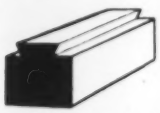

Rough to Size and Shape

Miter

Index

cut off and shape Structural Beams.

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November 22, 1954

Chain Reaction

Announcements of industrial shows and expositions ordinarily are routine news. But that rule of thumb didn't apply last week when the National Machine Tool Builders' Association officially confirmed reports that members will display their latest machines in Chicago next September. It was news of the sort that may set off a chain reaction of plant modernization, re-equipment and expansion unprecedented in industrial history.

The industry's show schedule and new model planning have been interrupted by war emergencies in the last decade and a half. In fact, it has been able to display new machines in a national show only once since World War II. That was in 1947; before that the previous showing was in 1935. For extended periods, machine tool people have been obliged to devote their energies on existing models for war production.

But, things have been happening since the return to peacetime. Development and design of machine tools have been accelerated by the return of intense competition. "Automation" has become a byword that means producing parts at the lowest possible unit cost, whether on a half-mile-long transfer line or a single automatic machine. Almost every day, "hush-hush" reports come in about new production setups that are beating the daylights out of costs. The urge is to keep a competitive edge even if only for a few months.

Added inducements to equipment replacement are the more lenient provisions of the new tax law and the more realistic attitude of the Internal Revenue Service. They recognize obsolescence as well as age in establishing depreciation schedules.

Also in the back of most men's minds is the fear that a third world war is inevitable, plus the realization that modern plants with modern tools win battles.

But the metalworking industry plans basically for peacetime and figures it will need 20 per cent more machining capacity by 1960 to provide for a continually advancing standard of living for 180 million people.

With these technical and economic stimuli at work, forward-looking management isn't waiting to bring its facilities up to date. The chain reaction already is setting in.

Irwin H. Such
EDITOR

BLUEPRINT FOR '55: This is the time of year analysts try to size up the year ahead.

Lest the fascination of the future obscure and minimize the present, we hasten to point out that in one respect, at least, business this year hasn't been as bad as the steel ingot production rate has indicated. Nearly all this year, the steel ingot rate—customarily a good gage of

business conditions—has been considerably below the level of business in general. Only now (p. 131) is it reassuming its time-honored role as an accurate gage. During the first nine months of this year consumers were relying heavily upon their inventories for steel. Around 7.8 million net tons of finished steel came from that source this year.

It looks like this year's ingot production will total 85,518,000 net tons. This will yield 63.3 million tons of finished steel. Add the 7.8 million tons from inventory, and you find consumption this year will be 71.1 million tons of finished steel. In only three years—1950, 1951 and 1953—has that been exceeded.

Most analysts think business in general next year will be about the same as it is this year. If steel consumption likewise remains the same —71.1 million tons of finished steel—the steel industry will have to turn out 94.8 million tons of ingots. That's equal to 76 per cent of present capacity. That rate is right in line with what most analysts are forecasting for next year.

DESIGN FOR COMPETITION: There's nothing too complicated about creating a good design. As in so many other things, once organization and planning are brought into play the solution involves little more than hard work.

You may not realize it, but on your company payroll right now are the makings of a highly competent design team. They're your experts on tooling, materials, production, testing and sales. Bring them together, outline the goals and co-ordinate their efforts and you're well on the way to a better product.

There are few hard and fast rules to follow in working out a design program. They will vary as much as the product itself. But there are a number of mileposts common to every program, and No. 10 in STEEL's Program for Management (p. 81) ticks them off for you.

CLEANER NEIGHBORS: It may never get to the point where steel mills are mistaken for country estates, but in the matter of smoke and air pollution control the industry is leading all others in the rate of equipment installation. Mills find that it's helping efficiency as well as community relations.

American Steel & Wire in Cleveland took advantage of the recent National Cleaner Air Week to show off the ultramodern gas cleaning facilities at its new "A" blast furnace. H. L. Jenter, manager of operations, told Cleveland civic officials that improved efficiency pays only a portion of the equipment cost, but the steel industry welcomes the opportunity to play a leading role in making good neighbors.

How far this smoke control movement has progressed is told in the story beginning on p. 100. Techniques have been evolved for everything from hot scarfing machines to cupolas.

STIFF DEMANDS: The United Auto Workers has announced demands it will make on the auto companies next year (p. 43). The concessions the union seeks are formidable, but not surprising. If granted, they would cost the industry 50 cents per hour per man.

As a matter of course, labor leaders usually ask for at least twice as much as they expect to get. Yet on one issue, the guaranteed annual wage, the UAW has worked itself out on such a long limb that it's hard to see how it can climb back without a sizable drop in prestige. Again and again, the union's president, Walter P. Reuther, has stated that the annual wage is a "must" in 1955, that the UAW must have GAW. Indeed, he has been so tough about the matter that wags in Detroit are calling him Walter P. Ruthless. Most auto company executives are vehemently opposed to GAW.

An impasse is shaping up. A bad strike in the industry next year is a serious possibility.

LABOR'S UNKEPT PRESS: Before one dismisses all thoughts of the 1954 midterm elections, it might be well to note that not all of the interest of labor union members in politics is confined to official union spokesmen. In all unions there are "official" publications which editorially hew to the "official" union line. Also in almost every field in which unions operate, there are independent labor publications. Many of these editorially promote programs and issues which often are diametrically opposed to the "official" union line.

In Ohio in 1952 these independent labor publications did a whale of a job for Robert A. Taft. In the midterm election of 1954 they turned up votes for candidates who were on the blacklist of CIO, AFL and the brotherhoods. One of the most effective proofs that a union cannot deliver en masse the votes of its members is the rebellious independence of labor's unkept press.

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Before Hamilton Manufacturing Company put the original automatic home laundry clothes dryer on the market, they had their share of production headaches that go with pioneering a new product. Not the least of these was finding a steel sheet that would take the necessary drawing operations without leaving "stretcher strains" that made good cabinet finishing impossible.

Inland was one of the first steel companies to tackle the problem and come up with a solution. They developed a special aluminum killed steel that worked on the first Hamilton dryer sold, and works as well today when an automatic clothes dryer is standard equipment in practically every modern home.

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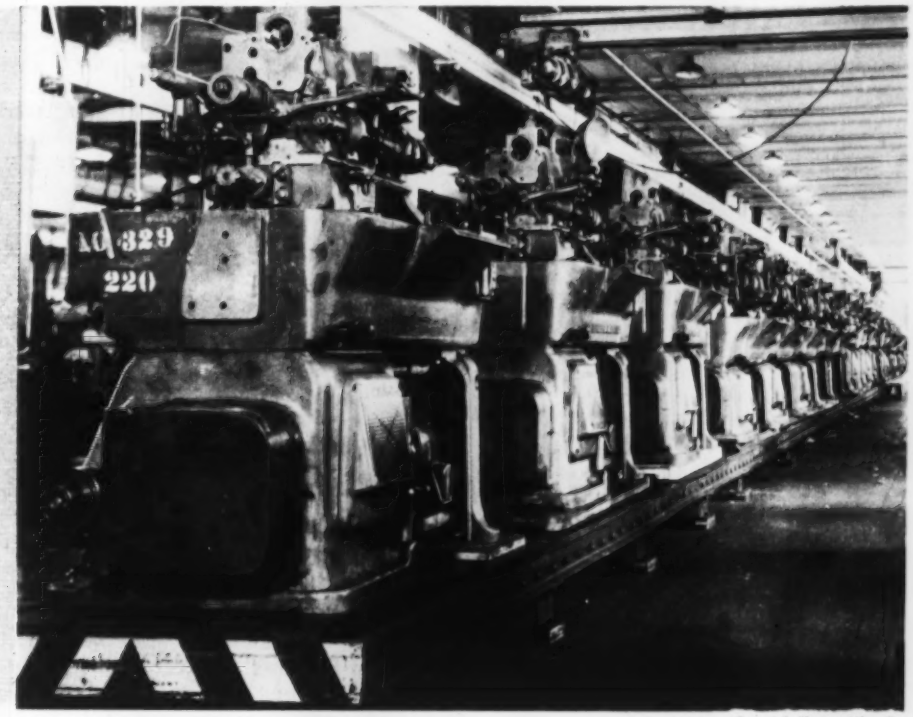


Brown & Sharpe Mfg. Co.

The Sales Job Doesn't Show Here, but . . .

It's the key to the machine tool picture in '55. With some new sales tools, including the September show in Chicago, salesmen are optimistic

IF NEARLY EVERYBODY in the industry is guessing correctly, 1955 will be a good year for machine tool business. While it will stop short of a full-scale boom, most builders expect a normal market which may top out slightly above 1954.

Much guesstimation is based on present sales activity which includes orders, quotations, inquiries and just plain interest. Although this activity got off to a sluggish start in 1954, it has picked up toward the end of the year. Builders see no reason why a fair share of it can't be translated into dollars in 1955.

Responsibility — Actually, the burden for getting next year's dollars into the till falls squarely on sales departments. Their job: To convert machine tools into lower costs, better products, faster production, easier operation and the multitude of other factors that make a machine tool buyer spend his money.

In his address at the annual meeting of the National Machine Tool Builders' Association, outgoing president Herbert L. Tigges told the members the key to the whole situation is selling. He cites the job as one of persuading customers to take advantage of a three-fold opportunity to cut costs in a competitive market.

Selling Tools—The triple facets of this "opportunity" are: 1. Depreciation revisions that allow buyers to get a shorter write-off period. 2. The accelerated rate of machine improvement and redesign that's bringing a host of better machines to market. 3. And next fall's machine tool show which will give customers an unequaled chance to see and compare many types and makes of machines in operation.

The show will be held in Chicago's International Amphitheatre from Sept. 6 to 17. It'll be the largest exhibit of machine tools ever held under one roof.

Two in One—More than 150 companies will have their latest models on hand, the lion's share of them

Machine Tool Shipments

1954	$960 million
1953	$1.2 billion
1952	$1.1 billion
1951	$632 million
1950	$316 million

Source: Bureau of Census, 1954 estimated by STEEL.

running. A simultaneous Production Engineering Show will be held at Navy Pier. It will be devoted to the exhibit of mechanisms, instruments, gages and other accessory equipment. More than 70 companies are already on the slate for this one.

The machine tool builders and their association expect big things from the show. They estimate it will attract at least 200,000 visitors.

And Now—As of today, business for the builders looks healthy. While even the most casual observer notes that it's below the 1953 level, the builders are optimistic about business tomorrow.

For one thing, the inquiries on tooling for 1956 automobiles are being picked up in some quarters. For another, recent figures on business in the industry have convinced them that, with proper selling and the proper product, they will get business in a peacetime market.

Target—The big drive, of course, is being made on the vast array of obsolescent machines in use. One builder who recently introduced some new machines frankly stated that his company designed with the direct intent of obsoleting everything they had ever made.

Dip—Some signs now indicate that both shipments and new orders dropped off in October. This comes after an encouraging pickup in the last few months.

Even if this dip materializes, the general trend is up. Best guess is that 1955 will be a fraction above 1954—that's enough to keep the aggressive builders squarely in the black.

Louis Polk, president of Sheffield Corp., 1st vice president of NMTBA

M. A. Hollengreen, president of Landis Tool Co., is new NMTBA president

Chicago: Tool Builders' Target

At Chicago's Coliseum, more machine tools will be shown in the Metalworking Machinery & Equipment Exposition, Sept. 6 to 17. This show is sponsored by Exhibition & Convention Management Inc., under the guidance of W. H. Eisenman and C. L. Wells. While they are director and assistant director, respectively, of the American Society for Metals, their Chicago machinery show has no connection with the society.

The Coliseum show is expected to draw 100 to 125 exhibitors, most of whom don't qualify for space in the other two shows at the Amphitheatre and Navy Pier.

Nautilus Welded Pipe Misused

Welded pipe incorporated into the piping system of the *Nautilus* by mistake was intended for structural uses and not designed for high-pressure purposes. Its failure in the atomic submarine (STEEL, Oct. 25, p. 93) was caused by its incorrect use, not because the pipe was defective, informed sources say.

The mistake is being rectified by Electric Boat Division of General Dynamics Corp., at Groton, Conn. The incident points up the need for a steel marking standard. In this case, the trouble occurred because in the division's stockroom the welded pipe for structural uses and the seamless for pressure uses looked exactly alike. Proponents of the marking standard say that had the tubing been marked to identify it, no problems would have resulted.

Welded pipe is used for high-pressure purposes, but the welded that got into the *Nautilus* pressure system was not designed for such conditions.

More Credit Aids Exports

Export-Import Bank's new credit policy aims at trade boost

THE EXPORT-IMPORT Bank of Washington is starting a new credit policy that will help U.S. manufacturers of capital equipment finance sales abroad.

Under the plan, credit lines will be authorized to permit a series of transactions by the exporter. Under the old policy, the bank extended credit for individual export deals. It will continue to do so when lines of credit are not requested or are not applicable.

Recipients—Two lines of credit have been authorized under the new plan — $4 million to Oliver Corp., Peoria, Ill., for sale of farm equipment; $6 million to Combustion Engineering Inc., New York, to export steam boilers and related apparatus. Applications from other companies are being studied.

Terms of financing will be similar to those for individual export transactions. The bank will guarantee payment of a portion of the obligation of the foreign importer so obligations may be purchased by commercial banks or other financial institutions designated by the exporter. The remainder of the obligation for each credit sale will be carried by the exporter himself.

Private Potential — The bank aims to assist the financing of U.S. foreign trade as far as possible with private rather than public capital. In that connection, it's discussing a proposal by some financial interests under which private capital would take a more active part in financing U. S. exports.

The new line-of-credit policy is also designed to permit maximum participation by private capital.

UAW Loads Its Bargaining Guns for 1955 Contracts

Highlighted by a guaranteed annual wage proposal, demands are the most far-reaching in history. All industry will be watching the pattern-setting battle

UAW's Walter P. Reuther

INCLUDING small print, the United Auto Workers' proposed contract (see below) asks for an estimated 40 to 50-cent an hour package.

The GAW clause would give the individual worker income for each two weeks of seniority up to a 52 week guarantee. The amount, combined with unemployment pay, would equal take-home pay.

Fatter Envelopes — Wage-wise, the union has three demands: A 5.3-cent an hour pay boost; freezing of the current 7-cent cost-of-living increment into the permanent base wage; an increase in the annual productivity pay increase, now 5 cents. Overtime pay demands include time and a half on Saturday, double time Sunday, triple time on holidays.

Heading the fringe benefits is the proposed pension hike from the current maximum of $144.50 a month, including social security after 30 years' service, to $167. The union also wants to scrap the 30-year minimum provision. In the health insurance program, it's proposed that the company pay all expenses instead of the current 50-50 company-worker split.

Plus This — Automation, too, comes under fire, with the announcement that the pay for people working such operations should reflect the higher responsibility involved and the higher capital investment per man.

Conspicuous by its absence was the 30-hour work week with 40-hour pay. Said the UAW executive board: "After the GAW has been secured, the shorter work week will take its place at the top of our bargaining agenda."

Final basic demands will be worked out at the UAW's convention in Cleveland next March 27. Convention delegates may also be asked to increase strike dues assessments for each member. Says Mr. Reuther: The strike fund, now estimated at $9 million, is "not enough."

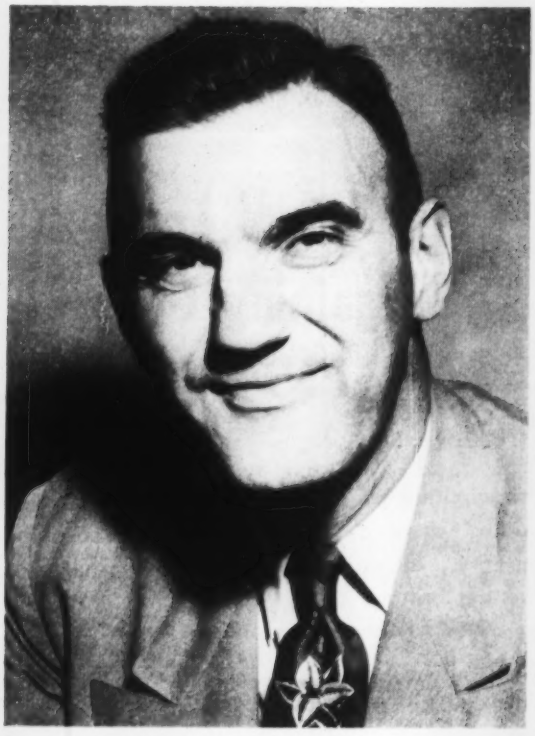
The Outlook—Major contract expiration dates are: General Motors—May 29; Ford—June 1; Chrysler—Aug. 31. Auto spokesmen are mum, but the pattern is emerging: Auto production will be high during the remainder of this year and the first quarter of next. Companies will make hay while the sun shines, for strike clouds will hang prominently at contract time.

CALIBRE OF THE BARGAINING GUNS

- **52-week guaranteed annual wage**
- **Wage increase of at least 10.3 cents an hour**
- **Reduction of contract length from 5 years to 1 or 2 years**
- **Pension boost to $2.50 a month per year of service**
- **Company paid health insurance for the worker and his family**
- **Company-wide seniority job bumping rights**

"Work simplification: A better product—at lower cost—at the right time—with the least effort"

Supervisors Can Join the Industrial Engineering Team



Thompson Products' Donald W. Fouse

MIKE WORKED in Thompson's valve packing department 40 years, the last three as supervisor. He'd long been troubled by a packing problem, but until he went to work simplification "school," he did nothing about it. His matriculation saved the company $4300.

The "school" is part of Thompson Products Inc.'s work simplification program. In its six years, Mike and his fellow supervisors have initiated improvements which have saved the Cleveland firm over $2 million.

Cost Cutting Answer—"The program is one answer to our long-range cost reduction problems," says Donald Fouse, division industrial engineer, who put the plan into operation. "The philosophy behind it is that every supervisor has industrial engineering talent that can be developed through training."

Only supervisors and engineering technicians are given the 10-session course. An individual case study approach is used, and each man is asked to bring to the course some specific problem which has been bothering him in his department.

Practical Application—"The key to this phase," explains Merle Roberts, supervisor of work simplification, "is to try to guide the supervisor into selecting a problem that he can solve. Through past experience, we can generally spot the problem that is too complicated for him and might result in a loss of enthusiasm for the program."

Time arrangement of the two-hour-long sessions is important, too. Classes are scheduled every other week. Conference leaders have time between sessions to contact the supervisor to help with the problem in his department.

Get the Facts—The second step of Thompson's work simplification

TEN STEPS TO WORK SIMPLIFICATION

1. **Could it be done with less reaching and lifting?**
2. **Would a rearrangement of the work place cut down on distance traveled?**
3. **Are tools handily located?**
4. **Is the right tool being used?**
5. **Is the worker made overly cautious or hesitant by unguarded hazards?**
6. **Does the present method require awkward body positions?**
7. **Are materials within easy reach?**
8. **Are supplies conveniently at hand?**
9. **If more than one person is involved, are efforts collective?**
10. **Could movements be arranged in a different sequence to get better results?**

course is to train the supervisor to gather all the facts pertaining to the problem he's trying to solve. Flow process charts and man-to-machine relationship charts teach the supervisor how to assemble these facts in an organized manner.

Then the supervisor learns to make an organized analysis of these facts and to determine a method of improvement. "We try to show the supervisor at this point that his solution probably lies in one of these four areas: Elimination of the operation, a combination of operations, a change in sequence of operations or in simplification."

The Test—The final step emphasized in the course is putting the program into action. Results attest the effectiveness of Thompson's individual case study approach: Better than 50 per cent of the problems "brought to class" are solved.

To date, about 1000 have taken the Thompson course. Classes are kept small—one leader for about 10 men—and an informal, conference-type atmosphere is maintained.

One Barrier Down—An important by-product of the program, officials point out, is the elimination of the frequent barrier between department supervisors and industrial engineering departments. Often the supervisor will come in with an idea that he can't resolve by himself. Industrial engineers are called in and the supervisor co-operates with them.

Officials also stress that supervisors do not get paid for their work simplication ideas as do regular employees in the "suggestion box" program. Where possible, supervisors get special recognition for their achievements, but officials strive to promote a sense of responsibility among the supervisors, getting across the idea that improvements are part of their job.

Number Pays Off—In the work simplification, Mr. Fouse states: "We don't look for more than the occasional revolutionary idea which will save a half million dollars. Payoff comes in the large number of small improvements that come on a less refined scale than the industrial engineer has been taught."

1955 GROSS NATIONAL PRODUCT CLIMBS TOWARD SECOND HIGHEST PEAK

	1952	1953	1954 Quarters (Annual rates) 1	2	3
	(billions of dollars)				
GROSS NATIONAL PRODUCT	346.1	364.9	355.8	356.0	355.5
Personal consumption expenditures	218.4	230.1	230.5	233.1	234.8
Durable goods	26.8	29.7	28.0	28.8	28.9
Nondurable goods	116.0	118.9	118.8	120.0	121.1
Services	75.6	81.4	83.6	84.3	84.8
Gross private domestic investment	50.7	51.4	44.5	45.6	45.3
New construction	23.7	25.5	26.0	27.0	28.3
Producers' durable equipment	23.3	24.4	22.7	22.4	21.8
Change in business inventories	3.6	1.5	−4.2	−3.8	−4.8
Net foreign investment	−0.2	−1.9	−1.1	−1.0	−0.2
Government purchases of goods and services	77.2	85.2	81.9	78.3	75.6
Federal (less Government sales)	54.0	60.1	55.0	51.3	47.9
National security	48.5	52.0	46.9	44.7	42.1
State and local	23.2	25.1	26.9	27.0	27.7
PERSONAL INCOME (before taxes)	271.2	286.1	285.1	285.7	286.2
NATIONAL INCOME	291.0	305.0	298.9	299.6	n.a.
Compensation of employees	195.4	209.1	206.4	206.6	207.2
Proprietors' and rental income	49.9	49.0	49.4	49.0	48.5
Corporate profits before tax and inventory valuation adjustment	38.2	38.5	34.1	34.9	n.a.
Corporate profits before tax	37.2	39.4	34.5	34.5	n.a.
Corporate profits after tax	17.2	18.3	17.5	17.5	n.a.
Net interest	7.4	8.4	9.0	9.1	9.2

n.a. = Not available.

Source: Office of Business Economics, U. S. Department of Commerce.

GROSS NATIONAL PRODUCT—a major yardstick of the nation's economic level — will hit $355.5 billion this year, the second highest in history.

That's down less than 3 per cent from the record $365 billion of last year, according to Commerce department figures. Gross national product (GNP) measures the dollar value of all goods and services produced in the U. S.

Direction—Significant factor in the 1954 figures compared to last year's is the different directions GNP components are taking: Personal consumption, new construction and state and local government expenditures have been higher this year. Producers' equipment and federal government outlays have been lower.

Personal consumption of durable goods, down this year from last, reflects generally the year's metalworking activity. Offsetting the drop, however, are increases in personal consumption of nondurables and services.

Spending Power—Reflecting the reduction in personal taxes, total disposable personal income for the first nine months of this year was at an annual rate of nearly $253 billion, up $3 billion from the same 1953 period.

Investment Casting Molds Big Future . . .

But growth brings problems. Diversification, industry co-operation and national standards are badly needed by the average company

INVESTMENT CASTING before 1940 was used mostly by dentists for gold inlays and by sculptors for statues. Industry demands for precision have since built the process to an annual sales volume of more than $250 million. About 100 companies serve the field.

Even by present-day standards, that's fast growth. And there's more to come. The Investment Casting Institute, Chicago, predicts another ten-fold increase over the next five years. So it's not surprising that the institute's current survey turns up evidences of growing pains.

The Norm—The average company today looks something like this: It's a corporation, started between 1945 and 1950. It has an investment of about $100,000 in plant and facilities. It employs about 50 people—35 production, two or three engineers and five each of inspection and administrative personnel. Its induction melting equipment handles about 100 lb of metal an hour, and it can turn out about 100 molds a day. It makes most of its patterns with wax. It has its own heat-treating facilities, but must go outside for x-ray, Magnaflux testing and chemical analyses.

Problems — It has other problems. It does most of its business, about 64 per cent, with the government. It feels that biggest immediate dividends are to be found in making aircraft components—complicated close-tolerance turbine parts are a natural for investment casting. Although it may also do business with machine tool, food, textile, farm, railroad and auto equipment industries, it is inclined to feel that more diversification might be healthy.

Here the survey shows that the smaller companies often have an edge. Generally, they're doing more than a third of their business with industry, with markets that don't lean directly on government policies. But big or small, investment casters have common problems born of rapid growth.

Solutions—They boil down to an education job with three major goals:

1. Educating purchasers on advantages, economies and limitations of the process.
2. Educating themselves on process limitations and best techniques for improving their products.
3. Development of an industry-wide set of standards.

Solutions are needed to such problems as insufficient diversification and promotion. Production costs, price quotations, dimensional accuracy, raw materials sources and exchange of technical information are fields where work has to be done.

Truck Pool Catches On

National Trailer Pool Inc. will expand operations by 100 new trailers. The $750,000 order which was placed with Fruehauf Trailer Co. supplements an earlier one with the same company for 500 trailers. The largest single order for trailers on record in the United States, it amounted to $4 million.

Made up of 13 midwestern trucking firms, National Trailer Pool of Minneapolis and St. Paul was formed to eliminate empty trailer runs. Any member can draw equipment and return it to the pool in any city.

Industrymen like the new transportation idea but some ask . . .

Should Piggyback Be a Common Carrier Service?

PIGGYBACKING is rapidly coming to a crossroad.

The question is whether it will be an exclusive railroad operation or a common carrier service, hauling anybody's truck trailers.

Act I—So far, piggybacking as a railroad operation has been something less than an overwhelming traffic getter. Between mid-July and mid-August, 1954, a group of eastern roads (Pennsylvania, B & O, Erie, Wabash, Nickel Plate and Lackawanna) moved 112 piggyback flat cars. That's less than one good night's piggyback traffic for the New Haven railroad, which has common carrier service.

The "railroad exclusive" group maintains that piggyback service —no matter what kind—requires time to smooth out and develop. They point out that the New Haven service has been available for three years.

Limited Success — They say their operation is a success—in a small way, to be sure. But it's growing. The Nickel Plate, for example, started piggybacking between Cleveland and New York, Cleveland and Chicago and Chicago and New York about three months ago. On Oct. 27, Buffalo to Chicago was added to the service. Last week (Nov. 15) St. Louis to Cleveland and St. Louis to Buffalo were added. Contemplated are St. Louis to New York and Chicago to Philadelphia service.

That history shows growing acceptance.

Favorable Experience — Companies that have used piggybacking, like Lincoln Electric Co. and National Malleable & Steel Castings Co., indicate their first experiences with all-railroad service were good —in-transit time was reduced, and damage in transit was reduced below that of straight motor carrier service. They intend to continue using and studying the service.

It bears repeating, however, that the all-railroad operation is many cars behind the New Haven volume. An informed traffic man estimates truckers have 20 to 50 per cent more volume to divert to rails if they can do it in motor carrier equipment. That's why the rumored service of Rail-Trailer Corp., Chicago, for the Pennsylvania railroad is causing such a wave of interest. It would make the railroads common carriers and conceivably could expand piggybacking terrifically.

All problems in piggybacking will not be resolved in a short time, but the next few months will see the common carrier concept brought to a real test; in fact, it may begin within the next month.

More Money for Highways

President Eisenhower's advisory committee on highways may up the kitty $26 billion on the previously announced $50 billion national highway building program.

General Lucius D. Clay, chairman of the committee, reports that the new proposals would authorize 40,000 miles of interstate highway system to be built over the next ten years. The proposals represent part of the highway building program designed to meet 1974 travel needs in 1964.

By E. C. KREUTZBERG *Washington Editor*

Patent Board Offers Inventions to Industry

DO YOU need a fresh approach or a new invention to overcome a production problem? The government may have what you need.

A bag full of inventions and ideas is available free to businessmen through wholly owned government patents and privately owned patents on which the government has licenses.

Somewhat Overlooked — Listing and abstracting are done by an overlooked government service, the Index of Inventions, which is maintained by the Government Patent Board. Dr. Archie M. Palmer is chairman.

Wholly owned patents are available to industry on a nonexclusive, royalty-free basis. They have proved valuable to manufacturers in suggesting products, processes and materials to be used in developing their own businesses. The list of patents on which the government holds licenses is of interest to government contractors because it discloses inventions that may be used without risk of infringement.

Ideas on the Market . . .

Several years ago the government-owned patents were recorded in a single volume—between 3000 and 4000 listings. Now they are put in categories to help businessmen find inventions relating to a specific field.

Seven of these books have been published in 1954, all of which may be bought from the Office of Technical Services, Commerce department.

One of most value to you might be *Metal Processes & Apparatus, Machinery & Transportation.* It lists and abstracts 175 inventions applicable to metal products and processes, 311 to machinery and 182 to transportation equipment. It classifies them as to industrial use as follows: Ferrous metal processes and apparatus, nonferrous metal processes and apparatus, coating processes and apparatus, agricultural equipment, powder metallurgical processes and apparatus, etc.

Examples of how these inventions can be translated into commercial success are not difficult to find: A new magnetic fluid clutch, a process for diamond die production, a new process for plating of nickel and cobalt.

Ideas for All . . .

No category is without its significance to some phase of metalworking. In the book on instrumentation, for instance, there are inventions for testing the embrittlement cracking characteristics of solutions, devices for detecting radioactivity, a fluid-selecting apparatus for handling corrosive liquids, a pocket radiation alarm and a pocket radiation meter.

In the book on ordnance, military contractors may get help from inventions listed under the following headings: Guns, howitzers, mortars, small arms, tanks, ordnance machinery and processes, ordnance measuring and testing apparatus, aiming devices, fire control apparatus, ammunition, ammunition components and miscellaneous ordnance items.

Added Service . . .

Another service performed by the Government Patents Board is the development of a policy to protect foreign patent interests of American industry and government. It places on the government agency concerned the primary responsibility for determining whether foreign patents should be sought on inventions in which the government has an interest, and whether the costs will be borne by the interested industry. In the absence of government action, the inventor may apply for foreign patents.

NEED AN INVENTION?

The Government Patents Board has issued listings of government-owned inventions available royalty-free, nonexclusive to industry, and government-licensed inventions available to government contractors. Below are seven categories of listings and the number of abstracts contained in each.

Metal Processes & Apparatus, Machinery & Transportation Equipment	**668**
Electrical Apparatus Including Electronics	**1920**
Ordnance	**647**
Instrumentation	**775**
Chemical Products & Processes	**1349**
Ceramic, Paper, Rubber, Textile, Wood & Other Products & Processes	**308**
Food Products & Processes	**265**

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Simon Ramo: Mathematics Is His Business

"MATHEMATICS is destined to become the new language of business."

That's the opinion of Dr. Simon Ramo who personifies the new kind of management, the scientist who applies his training to managerial problems.

He's an electrical engineer, author of two books, writer of numerous technical articles, holder of 25 patents and executive vice president of Ramo-Wooldridge Corp., Los Angeles.

Background—He and Dr. Dean E. Wooldridge organized the company Sept. 15, 1953. Its purpose: To conduct research, develop and manufacture guided missiles and electronic systems (for commercial and military applications). For financial and managerial backing, it became affiliated with Thompson Products Inc. It expects $10 million sales in the next 12 months and already has about 200 employees.

R-W's major volume thus far has been in aircraft fire control systems, guided missiles and other military work. But it plans more commercial activity. Its approach will be from two angles—as an architect of electronic systems for industry and as a specialized management consultant applying the latest developments in mathematics, physics and other sciences to such problems as production scheduling, inventory control and warehouse location and capacity. It is already manufacturing electronic items. Its subsidiary, Pacific Semiconductors Inc., formed only last June, produces semiconductor products. R-W's own commercial output will be of a specialized, low-production nature.

Biography—Dr. Ramo received his B.S. degree from the University of Utah and his Ph.D. in electrical engineering from California Institute of Technology. After ten years of electronics research and development with General Electric Co., he joined Hughes Aircraft Co. There he became director of guided missile development, then vice president for operations.

He and Dr. Wooldridge, who was also with Hughes and is now R-W president, were chiefly responsible for the Hughes-developed Falcon guided missile and the fire-control system to be incorporated in Convair's F-102 supersonic all-weather interceptor.

What's Ahead—Dr. Ramo says the brightest immediate prospects for commercial electronics "are in business data processing and automatic controls." But he adds: "A big job of education is needed. The greatest growth will come after more installations are in to show what can be done." He believes it conceivable that some day air freight will be shipped via commercial guided missiles, just one of hundreds of developments to be made possible by electronics.

"New electronic tools have great potentials," he points out. "But diagnose conditions first to see where they can best be used. You can add to problems if tools are badly used."

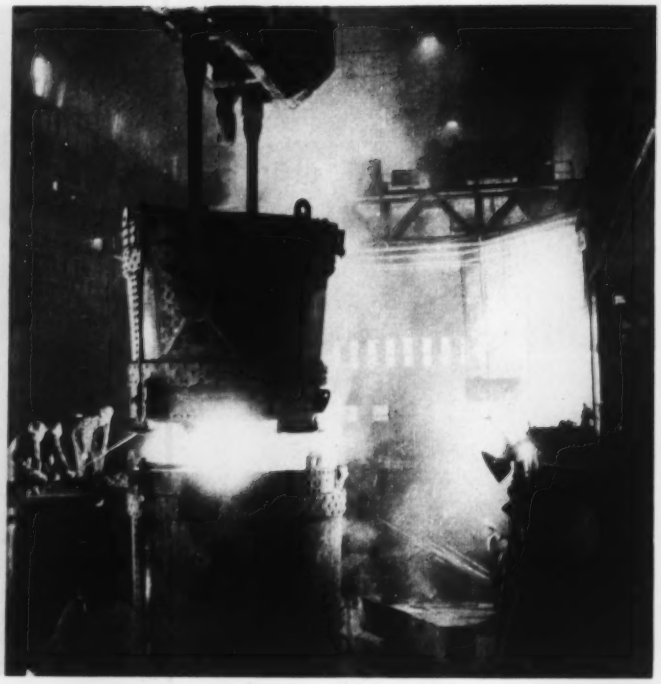
West European steel output for first three quarters points to record year

(in thousands of net tons)

1954			
JAN.	3640	MAY	3805
FEB.	3450	JUNE	3924
MAR.	3880	JULY	4208
APR.	3619	AUG.	4028
		SEPT.	4182

1954 total: 46,000,000+

1954 total estimated by STEEL.



No Break in Europe's Steel Output

Continued heavy orders of steel at Western European mills indicate a probable record steelmaking year in 1954. It means sharper competition for U.S. producers

STEEL OUTPUT in Western Europe continued strong through the third quarter of this year and could mount up to a record for the year as a whole.

European Coal & Steel Community countries, which include France and the Saar, West Germany, Belgium, Italy, Luxemburg and the Netherlands, may pour more than 42 million metric tons (that's 46-million-plus net tons) of steel in 1954, says an ECSC report for September. Such an output would mean a record for ECSC countries in aggregate, though individual member countries may not set national records.

Steady Gain—ECSC steel output has risen by 1.2 per cent, 3.4 per cent and 9.3 per cent in each of the first three quarters of 1954. Output for the nine months is 2.6 per cent ahead of the similar period in 1952—previous peak year for ECSC countries.

There's no sign of a break in demand. Late report to STEEL from Germany: "All mills are booked four to six months ahead. There are no surplus capacities, even in heavy plates. A certain stiffening of steel prices can be noticed, and new export orders are difficult to place here." From France: "Orders are numerous and delivery dates are lengthening. Steel users caught with light inventories are hard pressed. Prices are firm." From England (not an ECSC member but facing much the same market conditions): "Although steel production has increased, supply still falls short of demand, and delivery dates are being extended further and further ahead. Sheet and strip makers, for example, are quoting delivery in first half, 1955."

Where It's Going—What does that buoyant European steel output mean to U. S. metalworking? European steel is going somewhere, and whether it stays in Europe or goes elsewhere in the world, it competes with U. S. products. For first half, 1954, U. S. exports of iron and steel products to Europe ($52 million) gained on the second half, 1953, ($40.2 million) and were about even with first half, 1953, ($51.5 million). For the world as a whole, U. S. iron and steel exports in first half, 1954, ($243.2 million) were off 9 per cent from first half, 1953 ($266.5 million). Also machinery exports were off 8 per cent over the same period ($1326.7 million compared with $1449.2 million).

Continued high ordering of steel at European mills for next year's delivery is a tipoff for the U. S. exporting firms: European manufacturers believe they have a good chance to peddle their steel products in 1955; more competition can be expected from that quarter.

New Series for Businessmen

Late this month the Bureau of Foreign Commerce will inaugurate a new publication series to be called the World Trade Information Service. It will include four reporting "packages": Economic reports, operations reports, statistical reports and utilities reports.

One of the strong features of the new service is that businessmen may get a subscription for the kind of information they want instead of being forced to sift through a lot of unwanted material.

You can get full details from your nearest Commerce department field office.

Foreign Trade Notes

Baldwin - Lima - Hamilton Corp. will soon deliver its first canmaking machinery to Japan . . . On his recent trip to the U. S., Liberian President William V. S. Tubman said iron ore appears certain to become Liberia's number one money export in a few years . . . Union Miniere du Haut Katanga, Belgian mining concern which owns and operates the Shinkelobwe uranium mine in Belgian Congo (primary uranium source), became the first company outside the U. S. to join the Atomic Industrial Forum Inc., N. Y.

Developments in ECSC

Jean Monnet says he will resign as president of the European Coal & Steel Community's central governing agency, the High Authority. The resignation is to take effect next Feb. 10, because, says Mr. Monnet: "I want entire freedom of action and speech for the realization of European unity." Mr. Monnet believes the ECSC is already "probably the greatest revolution that Europe has ever seen."

Shortly before Mr. Monnet's statement, Britain had announced that it would get chummier with the ECSC, though it still will not become a part of the community. Britain will join in a formal council of association with the ECSC, three members representing each side. Here co-ordination of mutual policies on coal and steel will be worked out.

Britain declined to become an active member of ECSC because it didn't want outside authority wielding arbitrary power over its steel industry.

Got a Problem? Job To Get Out? Try This

LIKE HERTZ cars, warehouse space and special machinery, engineers can be rented, too. That's the unorthodox sales approach Fischer & Associates, Cleveland, makes in offering its orthodox engineering services. "Why not call a spade by its real name?" asks H. F. Fischer, president. "That's our business—renting engineering know-how to our customers."

Flexibility—Rented engineers—they work individually or in teams—operate two ways. They go into the customer's plant or handle his projects in Fischer's engineering department.

"Our most effective use of Fischer engineers is when our designing load becomes heavy," say Cleveland Pneumatic Tool Co. officials. "We give our detailing and routine work to their engineers, freeing more of our men for designing."

Closer Contact—Another Midwest firm calls in Fischer engineers for actual design work. "When they come to our plant to work," reports the chief engineer, "we can more effectively supervise and check on their work, often saving more time than if the work was 'farmed out,' and I'd have to travel back and forth consulting with the firm doing the work."

Fischer also uses the employment agency technique in renting its engineers. "If a company calls for an engineer or a team of engineers, we can give them background and experience resumes of the men available. If the company prefers, it can interview and pick its own engineers."

The Goal—"Our objective," says Mr. Fischer, "is to provide our customers with a 'second engineering department' to level off their peak load periods. We believe our plan is more effective and economical than the irregular expansion and contraction needed in an engineering department to meet peak load requirements."

U. S. Accepts Belgian Offer

The U. S. has said it plans to participate in the Belgian World's Fair in 1958. Early acceptance shows the sharp U. S. interest in such fairs. Of 56 countries and states invited, official acceptances have been received from only 5; U. S., the Vatican, Norway, the Netherlands and Luxemburg.

Outlook for Steel Demand

The Steel Club, a group of private Japanese steel producers, estimates new demand for iron and steel in Japan will total 2,698,000 tons in the next five years. They think new demand will come in this progression: 47,000 tons in fiscal 1954; 194,000 tons in fiscal 1955; 736,000 tons in 1956; 791,000 tons in 1957; and 930,000 tons in 1958. Cited as being big growth markets for Japan in the next five years: Fish boxes, steel furniture, concrete reinforcing bars and structurals.

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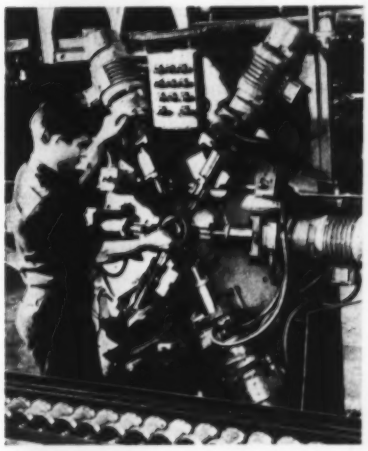
Close-tolerance power steering parts mean smooth assembly as . . .

Costs Drop, Precision Rises at Chrysler

THE AUTO INDUSTRY grows more intolerant all the time in the sense that tolerances continually diminish.

A zenith in this little engineering game to design something production men can't build is reached in Chrysler Corp.'s new coaxial power steering unit. It is the dream of hone and grinder salesmen, containing such nifties as 0.0005 in. on squareness of mating housing surfaces, 0.0003 in. on the control valve body inside diameter and 0.0002 in. on the parallelism of ring and spacer sides comprising the control valve body.



Six high-pressure hydraulic fluid passages are drilled simultaneously in piston body of power steering unit

Fewer Parts—It is also the exponent of some pretty worthwhile engineering. Contrasted with the previous unit, it has 77 parts instead of 94, weighs 26 lb instead of 52 and despite close tolerances, the unit is being built for less money than its predecessors.

No small operation, the new power steering setup occupies 171,205 sq ft of the Chrysler Trenton plant. Brought in to do the job are 413 machine tools, including gun-drills and hones, as well as milling machines, borers and grinders. Of these machines, 125 are special purpose pieces of equipment designed for the coaxial job. In addition, there are 127 other pieces of equipment, such as heat-treat ovens and test stands.

Prepared—Present production of the facility is rated at 50 an hour from each of two lines, one supplying Plymouth and Dodge, the other (with a slightly heavier unit) De Soto and Chrysler. By filling in a few intentional gaps in the floorspace, output from each of the two lines could be doubled at the drop of a few dealer orders.

Deriving its coaxial designation from the fact that its hydraulic operating mechanism is on the same axis as the center of the steering column, the unit has three major operating assemblies. They include a rack and sector gear, recirculating ball nut assembly and hydraulic piston and valve assembly. Since the unit operates at hydraulic pressures up to 800

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psi, with total spool valve movement of only 0.0025 in. up or down, tolerances only one-tenth the diameter of a Liberace whisker are called for.

Precision — Manufacturing begins with the machining of the aluminum upper and lower housings. Bored and faced, the castings are tested under pressure in a water bath. Faces where the upper and lower housings are to be joined must be square within 0.0005 in. The bore of the lower casting is then honed to a 15 micro-inch finish with a tolerance of 0.002 in. on a 3⅜-in. diameter.

The piston valve body, comprising four precision-finished rings and a spacer, is assembled on an arbor. As the piston emerges from heat treat, the assembly is inserted into the piston bore and the unit quenched, producing a shrink fit. The inside diameter of the valve body is then finish ground and honed to 0.0003 in. Close tolerances in the piston assembly are essential since the movement of the spool valve within the piston valve body directs oil flow against the piston.

The Mechanics — Carefully cleaned, these units enter the assembly area where the two pedestal-type conveyor lines with ball and socket fixtures hold the lower housing for assembly. As the lower housing moves down the conveyor, hydraulic piston, dividing bulkhead and hydraulic reaction assemblies are added. Rack and sector gear components, which have been heat treated after machining, are installed in the lower end of the housing.

Next come the connector and recirculating ball nut and worm assemblies. A neat trick is the precounting of the balls into a tube which is quickly emptied into the assembly, but an even neater trick is the receiver. To eliminate any play between worm gears and connectors, these parts are sorted into four assembly tolerance groups and color coded. Variation between parts in a single group does not exceed 0.0005 in., and that's some mighty close worm grinding.

The Test—Assembly completed, the units are placed on test stands and checked under hydraulic pressure as insurance against unwanted lubrication of the hood underside later on. They are also adjusted to ensure consistent steering action from full right to full left, this accomplished by the centering of the spool valve relative to the piston valve body.

While any one of the component parts is a story of precision manufacture in itself, the production of so many precision parts for one unit is perhaps unparalleled in the auto industry today.

Auto, Truck Output

U. S. and Canada

	1954	1953
January	594,789	614,000
February	573,801	628,017
March	672,485	752,149
April	676,233	782,491
May	621,249	684,843
June	623,732	713,778
July	543,534	756,592
August	523,799	640,186
September	364,441	605,228
October	311,968†	651,153
November		457,852
December		529,588
Total		7,815,877

Week Ended	1954	1953
Oct. 16	59,511	152,743
Oct. 23	62,376	149,794
Oct. 30	90,662	145,311
Nov. 6	116,179	133,783
Nov. 13	140,419†	115,748
Nov. 20	141,500*	108,852

Source: Ward's Automotive Reports. †Preliminary. *Estimated by STEEL.

Independents Gird for Next Year

A bid to make the Rambler "America's fourth low-priced car" is voiced by American Motors President George Romney. Both Hudson and Nash dealers will handle the car under the new push for the vehicle. That, coupled with the complete line of body styles available, means a volume of 160,000 to 200,000 cars, Romney believes. "Beyond that quantity, the advantages of increased volume are offset by the penalties," he says.

Meanwhile, a completely new civilian Jeep, described by Willys as "The finest ever built," will make its bow in December. Several hundred of the new Jeeps have already rolled off the assembly lines in Toledo to permit sampling of the Kaiser-Willys distribution system before they are publicly introduced. Kaiser-Willys passenger car and utility models will follow the Jeeps in introduction the last of the year. Arrangements have been made for their announcement through a closed circuit television show Dec. 8.

The last of the little three, Studebaker-Packard Corp. resumed production last Monday in its new Conner body and assembly plant completing transfer of production from the East Grand Boulevard plant of the firm. Accomplished in less than 60 days, the move involved more than 6000 truck loads from the old plant and the transplanting of more than 3 miles of conveyor lines and 5000 tools. Although the new facilities of the firm occupy 2 million square feet less floor space, the same productive capacity has been retained, thanks to good engineering and layout practices.

The boulevard plant will house defense production assignments, including the design and development work on a new 2000 lb lowthrust gas turbine engine assigned Packard by the Navy last week.

More New Models Out

Conventional Cadillac models for 1955 are highlighted by new side panel treatment and a boost to 250 hp. The Eldorado series is distinguished from the remainder of the line. It has a massive angular fin similar to the show car La Espada, and features 270 hp which is available on other Cadillacs as a special option.

Oldsmobile features a new side and grill treatment coupled with horsepower hikes to 202 hp in the "98" series and "Super 88" series, with 185 standard on the "88" series. A new air conditioning system entirely under the hood is also announced.

Entirely new Mercurys, featuring a wrap-around windshield, new bodies, improved transmission, improved chassis and up to 198 hp engines, are announced for 1955. Dual exhausts are standard equipment on the new Montclair line, as well as the Montereys, with a 188 hp engine, sans dual exhausts, available in the custom series.

The barrel does the bearing job better

in the fight against friction, engineers are using a new kind of bearing . . . a bearing built with barrel-shaped rollers.

Developed by Hyatt, the Barrel Bearing is "dual-purpose"—it takes both radial and thrust loads. But—and this is the important difference—unlike *ordinary* dual-purpose bearings, the Hyatt Barrel *operates at full load-carrying capacity under conditions of misalignment!*

Because of this self-aligning feature, loads on the Barrel Bearing are always ideally distributed over large areas of contact between races and rollers, with greatest load concentration at the strongest part of the rollers—at their major diameter. Roller ends cannot be overloaded.

But that's not all. The barrel shape of the rollers combines low rolling friction with high load-carrying capacity—making the Barrel Bearing ideal for a wide range of applications. And here's the clincher: this superior bearing is far less costly than you'd expect—thanks to a new manufacturing process used only by Hyatt.

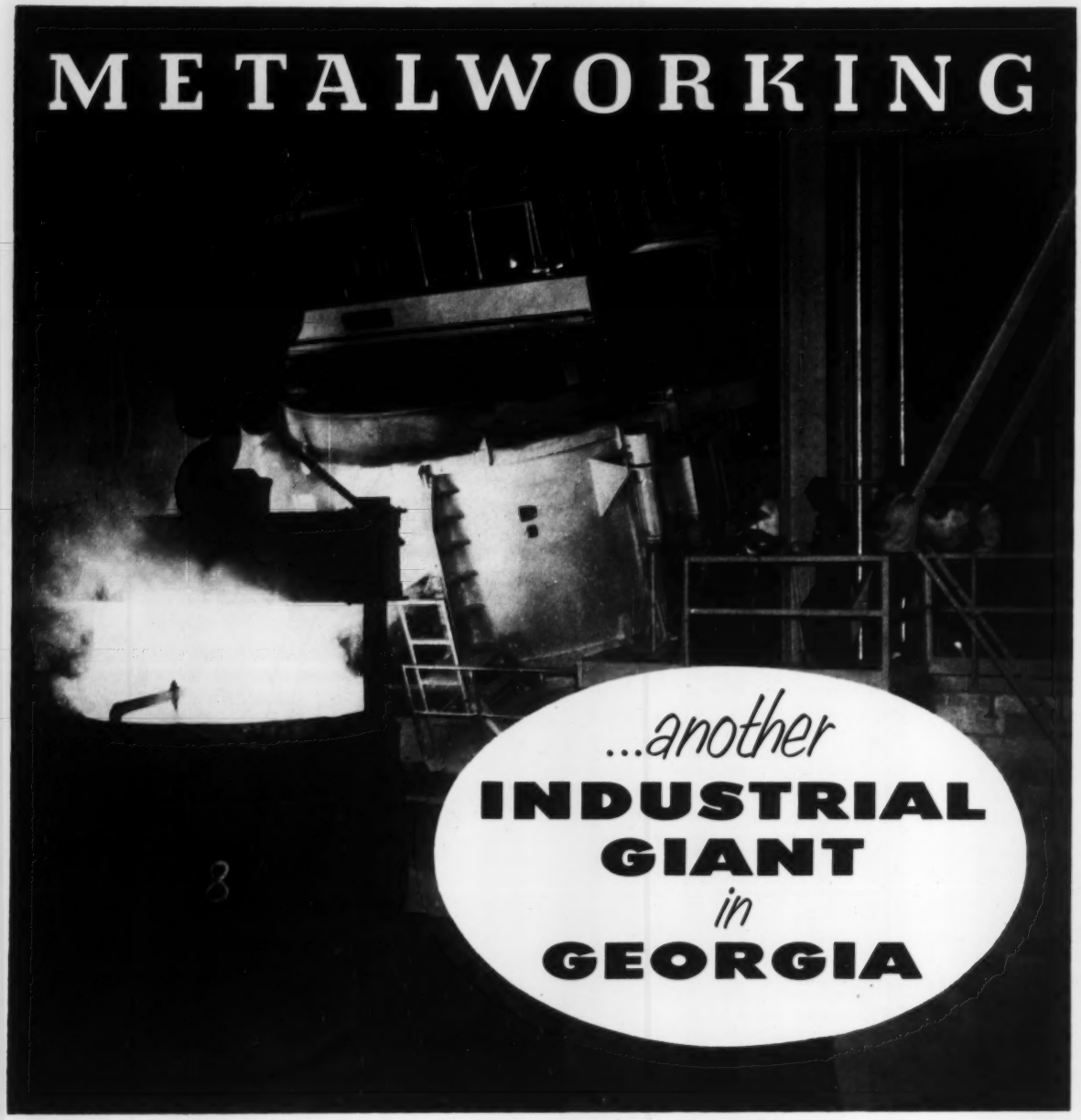
Does that cover it? You might think so, but it doesn't. There isn't enough space on this page to tell you everything about this new bearing. For full information, write to the address below.

HYATT ROLLER BEARINGS

STRAIGHT BARREL TAPER

HYATT BEARINGS DIVISION • GENERAL MOTORS CORPORATION • HARRISON, N. J.

METALWORKING



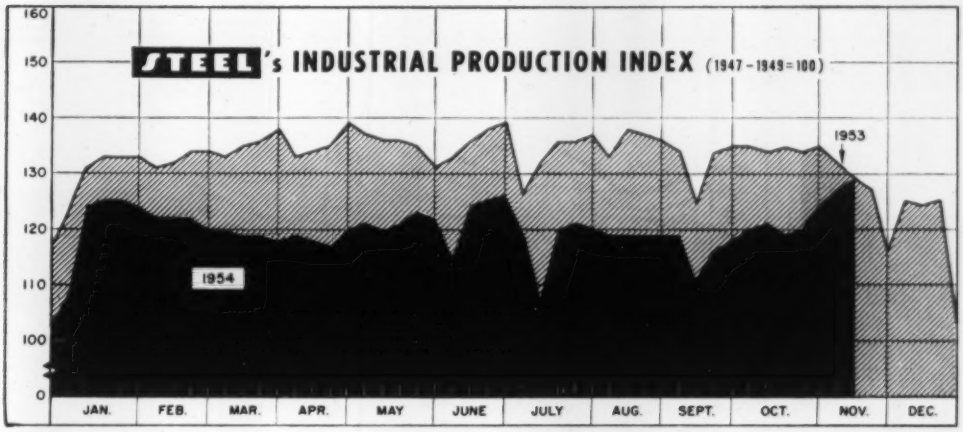
Not always has metalworking been the world's largest industrial market. Its growth since 1940 has been amazing, and the growth of Georgia's metalworking industry has kept step, stride for stride, with that of the nation and the world.

Many unique factors make Georgia a leading growth spot for industry . . . large and ever-growing home markets, unexcelled geographic advantages as the transportation hub of the entire southeast, nearness to the coal fields, an abundance of industrial power, and a plentiful, intelligent labor pool.

Today, along with its booming farms and textile mills, Georgia boasts more metalworking plants than at any time in its history. In 1940 there were slightly more than 3,000 manufacturing plants in Georgia. Today there are over 7,100—including many of America's big names in industry. More and more metalworking firms are learning—*it pays to produce in Georgia!*

Write Department M for latest facts and figures today.

GEORGIA DEPARTMENT OF COMMERCE
NELSON M. SHIPP, *Secretary* • 100 STATE CAPITOL • ATLANTA, GEORGIA



LATEST WEEK*	129
PREVIOUS WEEK	127
MONTH AGO	119
YEAR AGO	129

* Week ended Nov. 13.

Based upon and weighted as follows: Steel Output 35%; Electric Power Output 32%; Freight Car Loadings 22%; and Automobile Assemblies (Ward's Reports) 11%.

Profits in 1954: Doing Better Than Expected

METALWORKING may come to look upon 1954 as not such a bad year after all. It's true that many segments of the industry have had better ones, but, just the same, many companies are having their best year, profitwise at least. In many cases, though, reduced taxes rather than increased sales make the difference.

Of 498 companies in a National City Bank of New York survey, three out of five had decreases in dollar sales billed, and aggregate sales were 9 per cent lower. Pre-tax earnings were down 20 per cent, but after-tax income was up 4 per cent. On the average taxes in 1954 took 49 per cent of pre-tax earnings against 60 per cent last year.

Increases — Metalworking was prominent in groups showing both increases and decreases in profits. For example, leading office equipment firms in the first 9 months of 1954 boosted profits 28 per cent over the same period of 1953. In the third quarter, their net income was up 38 per cent over the like 1953 period.

Auto and truck manufacturers had income in the first 9 months of 28 per cent over last year. Also doing quite well are electrical equipment, radio and television, up 15 per cent; machinery, up 6 per cent; and building, heating and plumbing equipment, up 5 per cent. The year-end balance sheets should read even better as industrial production goes up.

Slides — Some other important parts of metalworking didn't fare as well. In iron and steel, profits were down 23 per cent in the first 9 months. The third quarter was particularly poor, showing a drop of 31 per cent from last year.

A parallel situation was present in auto parts, with profits off 26 per cent for 9 months and 39 per cent in third quarter. Railway equipment, too, was in about the same fix, with income down 20 per cent for 9 months and 28 per cent in the third quarter.

Outlook—On the brighter side is

BAROMETERS OF BUSINESS

	LATEST PERIOD*	PRIOR WEEK	YEAR AGO
INDUSTRY			
Steel Ingot Production (1000 net tons)[2]	1,882	1,874	2,044
Electric Power Distributed (million kwhr)	9,150[1]	9,357	8,457
Bitum. Coal Output (daily av.—1000 tons)	1,406	1,500	1,474
Petroleum Production (daily av.—1000 bbl)	6,175[1]	6,191	6,219
Construction Volume (ENR—millions)	$371.5	$287.1	$152.8
Automobile, Truck Output (Ward's—units)	140,419	116,179	115,748
TRADE			
Freight Car Loadings (unit—1000 cars)	685[1]	695	727
Business Failures (Dun & Bradstreet, no.)	227	204	155
Currency in Circulation (millions)[3]	$30.3	$30.1	$30.5
Dept. Store Sales (changes from year ago)[3]	+4%	+4%	+3%
FINANCE			
Bank Clearings (Dun & Bradstreet, millions)	$19,229	$18,535	$15,115
Federal Gross Debt (billions)	$278.7	$278.8	$275.0
Bond Volume, NYSE (millions)	$25.0	$14.4	$14.9
Stocks Sales, NYSE (thousands of shares)	16,157	10,561	5,718
Loans and Investments (billions)[4]	$84.9	$84.8	$79.4
U. S. Gov't. Obligations Held (billions)[4]	$37.4	$37.5	$31.7
PRICES			
STEEL's Finished Steel Price Index[5]	194.53	194.53	189.38
STEEL's Nonferrous Metal Price Index[6]	217.2	218.3	204.6
All Commodities[7]	109.7	109.7	109.9
Commodities Other Than Farm & Foods[7]	114.6	114.6	114.5

*Dates on request. [1]Preliminary. [2]Weekly capacities, net tons: 1954, 2,384,549. 1953, 2,254,459. [3]Federal Reserve Board. [4]Member banks, Federal Reserve System. [5]1935-1939=100. [6]1936-1939=100. [7]Bureau of Labor Statistics Index, 1947-1949=100.

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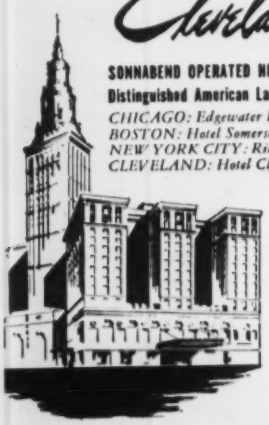
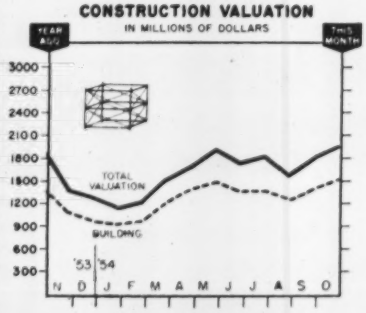
NEW YORK CITY: Ritz Tower Hotel
CLEVELAND: Hotel Cleveland



THE BUSINESS TREND

CONSTRUCTION VALUATION
IN MILLIONS OF DOLLARS

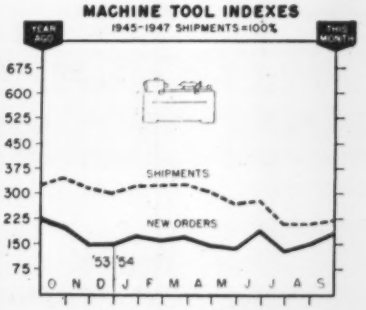


37 States	Total		Building	
	1954	1953	1954	1953
Jan.	1,151.9	1,075.9	935.6	876.0
Feb.	1,221.3	1,021.3	977.5	792.9
Mar.	1,527.5	1,374.5	1,199.8	1,054.4
Apr.	1,691 9	1,741.5	1,401.6	1,354.2
May	1,925.3	1,606.1	1,497.6	1,219.8
June	1,733.3	1,115.5	1,376.7	922.3
July	1,536.9	1,793.3	1,386.9	1,417.8
Aug.	1,572.9	1,414.4	1,243.3	1,053.4
Sept.	1,816.2	1,741.7	1,424.2	1,290.7
Oct.	1,965.3	1,892.4	1,522.8	1,392.7
Nov.	.....	1,394.1	.....	1,096.0
Dec.	.....	1,279.8	.....	973.8
Total	.....	17,423.5	.....	13,455.0

F. W. Dodge Corp.

Charts copyright 1954 STEEL.

MACHINE TOOL INDEXES
1945-1947 SHIPMENTS=100%



	New Orders		Shipments	
	1954	1953	1954	1953
Jan.	173.5	255.8	319.4	361.6
Feb.	159.8	282.1	323.1	354.5
Mar.	169.6	327.0	327.2	375.9
Apr.	142.8	276.8	302.7	372.7
May	139.5	246.4	270.3	356.0
June	185.2	273.4	276.3	342.2
July	124.7	247.3	205.7	267.6
Aug.	147.9	286.9	203.7	299.6
Sept.	179.8*	223.7	213.6*	328.3
Oct.	....	198.7	....	348.4
Nov.	....	146.6	....	320.2
Dec.	....	149.8	....	301.4

* Preliminary
National Machine Tool Builders' Assn.

rising steel production which will bring total 1954 profits somewhat closer into line with last year's. Auto suppliers, too, should have a good fourth quarter.

Railroads had a profit slump of 38 per cent for 9 months and 24 per cent for the third quarter, so their suppliers can't look for too much of an improvement for some time. Some slight increase may be in the offing, but it won't be much.

An encouraging sign for all industry, though: Net income per sales dollar is up to 6.6 cents in the first 9 months of 1954, compared to 5.8 cents in the 1953 period. If that figure can be maintained, rising sales will boost profits considerably in the fourth quarter and into 1955.

Record Building in '55 . . .

Construction will have another boom year in 1955, say the Commerce and Labor departments. Predictions are for a smashing $39.5 billion in new construction, 7 per cent over the $37 billion indicated for this year.

Particularly encouraging is the estimate that the increase will be shared by both private and public builders. Giving private building its greatest boost will be new nonfarm residential activity. That will account for more than half of all private construction, estimated at $27.4 billion for the year.

The fact that government experts expect private residential building to stay high indicates the outlook is for a rather stable level of economic activity, high consumer income and spending.

Industrial building is expected to be down from 1954. That phase of construction has been in a gradual decline for about two years. But, chances are, the rate of decrease will begin to level off and that the drop between 1954 and 1955 will be less than it was from 1953 to 1954.

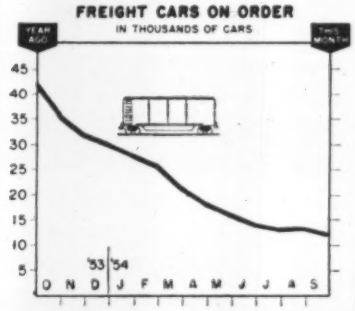
Expanding Roadways . . .

In public construction, highways and schools will be important bolstering items. Highway building is forecast at $4.2 billion, one-fifth higher than the 1954 level. Helping push up the total road building will be expanded federal aid and more construction of toll roads.

Federal work will show another decline, although the drop will be smaller than this year's. Industrial building, conservation and de-

FREIGHT CARS ON ORDER

IN THOUSANDS OF CARS

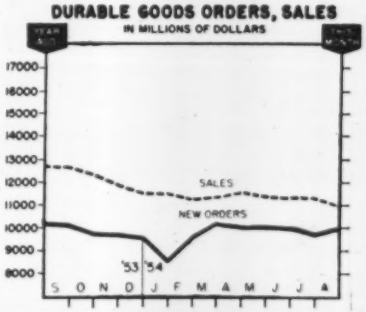


	Awards		Backlogs (end of month)	
	1954	1953	1954	1953
Jan.	2,942	7,406	27,959	77,414
Feb.	2,057	2,284	25,441	71,882
Mar.	348	3,247	20,966	68,553
Apr.	909	2,102	17,817	62,637
May	1,071	1,645	15,615	57,345
June	1,139	1,453	13,860	52,315
July	883	1,671	12,889	47,423
Aug.	2,425	3,913	13,013	45,735
Sept.	2,396	3,867	11,993	42,198
Oct.	....	1,705	.....	35,171
Nov.	....	2,858	.....	31,869
Dec.	....	2,159	.....	29,950
Total	....	34,310		

American Railway Car Institute.

DURABLE GOODS ORDERS, SALES

IN MILLIONS OF DOLLARS



In Millions of Dollars*

	New Orders		Sales	
	1954	1953	1954	1953
Jan.	8,475	12,454	11,580	12,508
Feb.	9,629	12,416	11,278	12,666
Mar.	10,206	12,520	11,385	13,116
Apr.	10,021	12,702	11,502	13,398
May	10,050	13,101	11,344	13,148
June	9,985	12,392	11,395	13,166
July	9,700	11,600	11,287	13,410
Aug.	9,971	10,139	11,036	12,730
Sept.	....	10,110	.....	12,698
Oct.	....	9,677	.....	12,376
Nov.	....	9,631	.....	11,867
Dec.	....	9,567	.....	11,576

*Seasonally adjusted, U. S. Bureau of Business Economics.

velopment projects will share the decrease. On the other hand, some slack will be taken up by stepped-up work at military bases.

More and More Homes . . .

More than 1 million new homes have been built in 1954. That's the second-best total on record, surpassed only by 1950.

October activity, set at 106,000 by the Labor department, was 18 per cent over the same month of last year.

F. W. Dodge Corp. has also come out with an estimate of construction for next year. Vice Chairman Thomas S. Holden thinks that 1955 will surpass by 6 per cent what looks like a record high in 1954.

Repair and modernization, important aspects of construction, are also due for another good year, according to Mr. Holden. He says that such building may have amounted to as much as $1 billion a month in 1954 and that the outlook is for about the same level in 1955.

Room for Growth . . .

Another Dodge economist, Dr. George Cline Smith, treats a different phase of the high levels of construction activity. He says there is no reason to fear a collapse in construction. In fact, he says, there is room for considerable expansion.

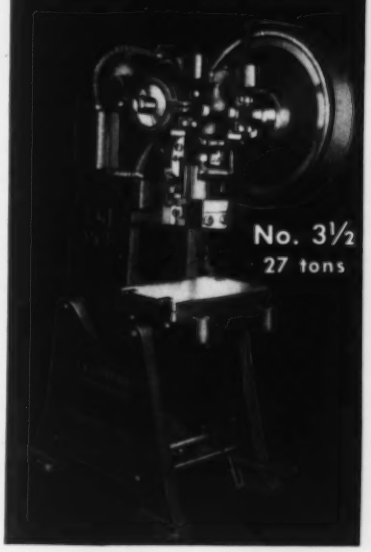
In what he calls the real boom in the late '20s, construction amounted to more than 15 per cent of the total national output. For the last three so-called record-breaking years, it has averaged less than 10 per cent.

Morale Booster . . .

Also predicting better business in 1955 is the Business Survey Committee of the Purchasing Agents Association of Chicago. For the first quarter, 61 per cent of respondents said business will be better than in first quarter of 1954. Only 10 per cent expected business to be worse.

Other better business signs noted are a trend toward higher inventories, higher employment, strengthening production and an increasing backlog of orders. More than twice as many respondents report a larger backlog of orders than report lower. Buying policy is moving into the longer brackets, 30 to 60 days and longer.

NEW
L&J PRESS



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SPECIFICATIONS

Strokes per minute	120
Ram stroke, standard	2½"
max. stroke (to order)	4"
Ram overhang, center of ram to frame	6¾"
Die space, standard*	8¼"
special,* up to	12¼"
Bolster plate area	21½" x 13"
Opening through back	10"

* bed to ram, stroke down, adjustment up

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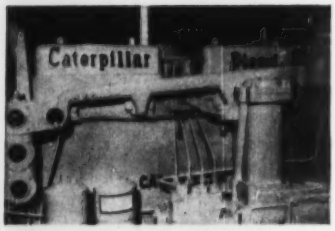
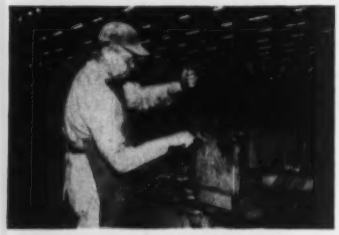


The fuel injection system of this Caterpillar diesel engine is made from quality-controlled Summerill Diesel Tubing.



Summerill Diesel Tubing can be pre-formed to any shape you desire right in our plant.

These Cats are rugged. They're built to operate over the toughest terrain in the book. Every part takes a constant beating under conditions where a failure involving a few cents worth of material could cost hundreds of dollars in time lost.

Caterpillar Tractor Co., Peoria, Ill., uses Summerill Diesel Tubing for high pressure fuel injection lines because they know from experience that it always meets specifications. And you'll find that you can get the same excellent results in your product with Summerill.

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JOHN D. WILSON
. . . heads SPS Sel-Lok Spring Pin

John D. Wilson was appointed manager, **Sel-Lok Spring Pin Division,** Standard Pressed Steel Co., Jenkintown, Pa. He was chief clerk in the SPS automatics division.

Clearing Machine Corp., Chicago, division of U. S. Industries Inc., appointed **E. P. Cunningham** and **A. Clements** vice presidents. Mr. Cunningham has charge of sales. Mr. Clements, general manager of the Hamilton, O., plant, now heads the plant as vice president.

Morse Chain Co., a Borg-Warner Corp. subsidiary operating plants in Ithaca, N. Y., and Detroit, named **Louis P. Smith** vice president of manufacturing. **M. V. Bailliere,** former controller and assistant secretary at Ithaca, is now responsible for all finances of the company. **Norman C. Bremer,** chief engineer at Ithaca, takes on added duties of chief engineer at Detroit.

Joseph W. Mueller was made works manager of the Kenosha, Wis., plant of **Nash Motors Division,** American Motors Corp. He was assistant manufacturing manager, Kelvinator Division.

T. C. Sells was named to a new post of manager of operations at **Allegheny Ludlum Steel Corp.,** Watervliet, N. Y. **Richard P. Stemmler** resigned as assistant plant manager.

DAVID E. ALLEN
. . . Anaconda W&C sales v. p.

David E. Allen, general sales manager, was elected vice president in charge of sales, **Anaconda Wire & Cable Co.,** New York. **Charles H. Porter** and **Maurice J. McCarthy** were named commercial vice presidents. **L. R. Love,** former vice president-sales, remains with the company as a vice president and will serve in an advisory capacity. **Victor di Lustro** was made general manager of all company mills with headquarters at Hastings-on-Hudson, N. Y., and **C. F. Randall** was made manager of production planning.

M. A. Cudlip was elected president and treasurer, **McLouth Steel Corp.,** Detroit. Formerly vice president-treasurer, he has been acting president since the death of **Donald B. McLouth,** last July.

Cortis F. Sherman, formerly general sales manager, Henry & Wright Division, Emhart Mfg. Co., joined **Magnetic Metals Co.,** Camden, N. J., as chief engineer.

R. R. Williams Jr. was appointed manager of mines for **Colorado Fuel & Iron Corp.,** New York.

E. A. Williams was made manager of the **Eastern Switchgear Division,** Federal Pacific Electric Co. He has headquarters at the new switchgear plant in Scranton, Pa. Mr. Williams was with Railway & Industrial Engineering Co.

J. A. SCHAEFER
. . . Dreis & Krump Mfg. executive v. p.

Dreis & Krump Mfg. Co., Chicago, elected **J. A. Schaefer** to the newly created post of executive vice president. He has been sales manager.

J. J. Gallagher was elected president of **Yates-American Machine Co.,** Beloit, Wis. He succeeds **E. J. Dalton,** former chairman and president, who continues as chairman.

Frank Coolbaugh, vice president-western operations, **Climax Molybdenum Co.,** New York, was elected president and a director of **Climax Uranium Co.** He replaces **John H. White Jr.,** resigned. Mr. Coolbaugh is now in charge of all mining, milling and exploration operations of both Climax Molybdenum and its associated companies.

Convair, a division of General Dynamics Corp., San Diego, Calif., appointed **A. W. Morgan** assistant manager-operations; **George A. Covington,** assistant to the manager; and **Roy H. Gilliland,** manager of quality control.

Line Material Co. appointed **Richard Kirk** chief engineer with offices at the Kyle plant at South Milwaukee, Wis. He is succeeded as product manager of the Kyle electrical line by **Frank McStay.** Mr. Kirk will handle engineering duties previously administered by **Anthony Van Ryan,** who recently returned to Line Material on a part-

LeROY M. GILL
. . . Michigan Oven sales manager

CARL W. PETERSEN
. . . Dodge Mfg. v. p.-works mgr.

B. J. HEDGER
. . . national sales mgr. at Binks Mfg.

time basis after an extended leave of absence.

LeRoy M. Gill was made sales manager of **Michigan Oven Co.**, Detroit. He joined the firm in 1949.

William S. Ginn was made general manager of **General Electric Co.'s** transformer division at Pittsfield, Mass. He formerly served as general manager of that division's power transformer department. **Francis E. Fairman Jr.**, who resigned as vice president and general manager of the transformer division, continues to serve the division as a consultant.

L. W. Moore was made superintendent, open-hearth department, at **Wheeling Steel Corp.'s** Steubenville, O., Works. He succeeds the late **E. H. Leathers.**

At the industrial fastener division, **Oliver Iron & Steel Corp.**, Pittsburgh, **E. M. Welty** was made executive sales representative. He is succeeded as general manager of sales by **E. L. Bartsch. Robert F. Neuhard** was made assistant general manager of sales.

Charles E. Moyer was made superintendent of the open-hearth department at **Republic Steel Corp.'s** Buffalo district. **Donald A. Husband** becomes assistant superintendent. Mr. Moyer replaces **Harry H. Northrup**, now assistant district manager. **Charles W. Barrett** moves up to district manager.

Carl W. Petersen was elected vice president and works manager, **Dodge Mfg. Corp.**, Mishawaka, Ind. He was general superintendent. **Edgar M. Carver**, first vice president, has retired but continues as a director and will act in an advisory capacity.

Firth-Loach Metals Inc., McKeesport, Pa., organized last May to produce carbide metal for the tool and die industry, elected **Louis De Marco** vice president in charge of sales and engineering and **James E. Gray** as sales manager. Both Mr. De Marco and Mr. Gray were formerly associated with Firth-Sterling Inc.

B. J. Hedger was made national sales manager, industrial division, **Binks Mfg. Co.**, Chicago. He was Chicago district sales manager.

Haskel J. Ross, manager of the R. D. Werner Co. plant at Greenville, Pa., was named manager of **Kaiser Aluminum & Chemical Co.** at Halethorpe, Md.

Norman J. Froelich was elected president, **Gulf Steel & Wire Sales Co.**, Pittsburgh.

Chance Vought Aircraft Inc., Dallas, promoted **Fred N. Dickerman** from chief engineer to director of engineering, a newly created posi-

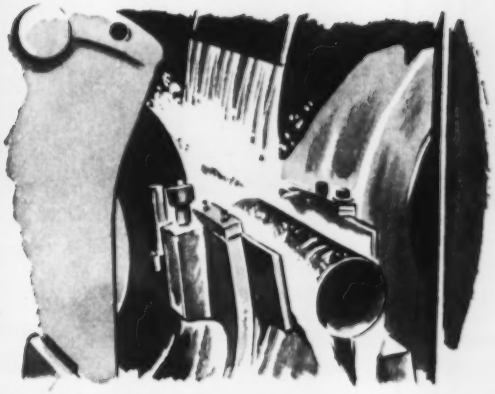
LOUIS DE MARCO

JAMES E. GRAY

. . . Firth-Loach Metals executive positions

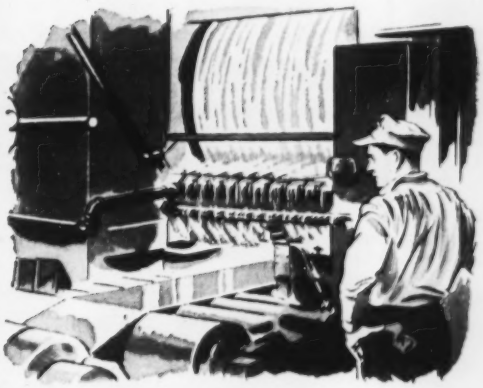
New S.E.C.O. is Tops For These Operations

CUTTING WITH NEW S.E.C.O. Tools stay cool—require less frequent grinding. Finishes are uniformly good.



GRINDING WITH NEW S.E.C.O. Surface finishes are good. Loading and glazing of wheel are reduced—wheel life is prolonged.

WASHING WITH NEW S.E.C.O. Thorough removal of grease and dirt provides clean surfaces for smooth, long-lasting finishes.



ROLLING WITH NEW S.E.C.O. Rolls stay clean. You get maximum reductions and low power consumption.

New Sunoco Emulsifying Cutting Oil increases production, cuts operating costs. Its high machining efficiency permits uniformly good finishes, prolongs tool life. Its high detergency and purity keep tools, parts and machines clean. Its excellent mixing qualities permit its use in cold, hard or hot water. Test New S.E.C.O. in your own plant. For more information, call your nearest Sun office or write SUN OIL COMPANY, Philadelphia 3, Pa., Dept. S-11.

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. . . gen. mgr. of Alcoa's fabricating div.

CHARLES D. SHANNON
. . . president of P. O. McIntire Co.

A. O. DEGLING
. . . American Can Co. v. p.-purchasing

tion. **Raymond C. Blaylock,** assistant chief engineer, was made chief engineer.

Aluminum Co. of America, Pittsburgh, appointed **John L. Patterson** general manager of its fabricating division to succeed **James P. Haight,** who fills the newly created post of chief engineer. **C. L. Kessler** was made chief metallurgist at the Massena, N. Y., Works. He is replaced as assistant chief metallurgist at the Edgewater, N. J., Works by **A. M. Miller. F. O. Traenkner** was made assistant chief metallurgist at the Massena Works, the position formerly held by Mr. Miller.

George L. Teller was transferred from **Allis-Chalmers Mfg. Co.'s** Philadelphia purchasing division regional office to the West Allis, Wis., Works' purchasing department as co-ordinator of steel castings. He is replaced at Philadelphia by **James J. Gilboy.**

Charles D. Shannon, former vice president-general manager, was elected president of **P. O. McIntire Co.,** Cleveland. **Alfred G. Goglin,** former superintendent, was elected vice president and general manager.

Charles B. Bendix joined **Union Asbestos & Rubber Co.'s** heating and cooling division, Chicago, as manager of contract sales. He was associated with Automatic Burner Corp.

Bert H. McGill was elected president and general manager, **Eclipse Fuel Engineering Co. of Canada Ltd.,** Toronto, Ont. He was vice president-general manager of Toronto Hardware Mfg. Co. Ltd.

W. J. Plankenhorn, research associate professor of ceramic engineering, University of Illinois, joined **Chicago Vitreous Corp.,** Cicero, Ill., as senior project engineer.

American Can Co., New York, elected **A. O. Degling** vice president in charge of purchasing and traffic. He was general manager, engineering department and is replaced by **L. A. Britzke,** assistant general manager.

Norman C. Michels was appointed to the newly created position of assistant vice president in charge of engineering for U. S. Steel Corp.'s **Tennessee Coal & Iron Division,** Birmingham. The appointment will be effective Dec. 1. For the last three years, Mr. Michels has been at Pittsburgh, serving as chief engineer-project development for the corporation's engineering division.

Fred H. Bey was appointed general manager, homes division, **United States Steel Corp.'s** Union Supply Co. He has headquarters at Glenshaw, Pa. Mr. Bey succeeds **Edward E. Miller,** now residential sales manager, U. S. Steel Homes Inc.

OBITUARIES . . .

G. Greer Coolidge, 69, executive assistant to the president and a director of **Harbison-Walker Refractories Co.,** Pittsburgh, died Nov. 2. He was senior vice president from 1933 to 1950.

Daniel W. O'Leary, 70, superintendent of the Johnstown, Pa., wheel plant of **Bethlehem Steel Co.,** died Nov. 2.

Fred W. Blaisdell Jr., 43, general works manager, **Warner & Swasey Co.,** Cleveland, died Nov. 12.

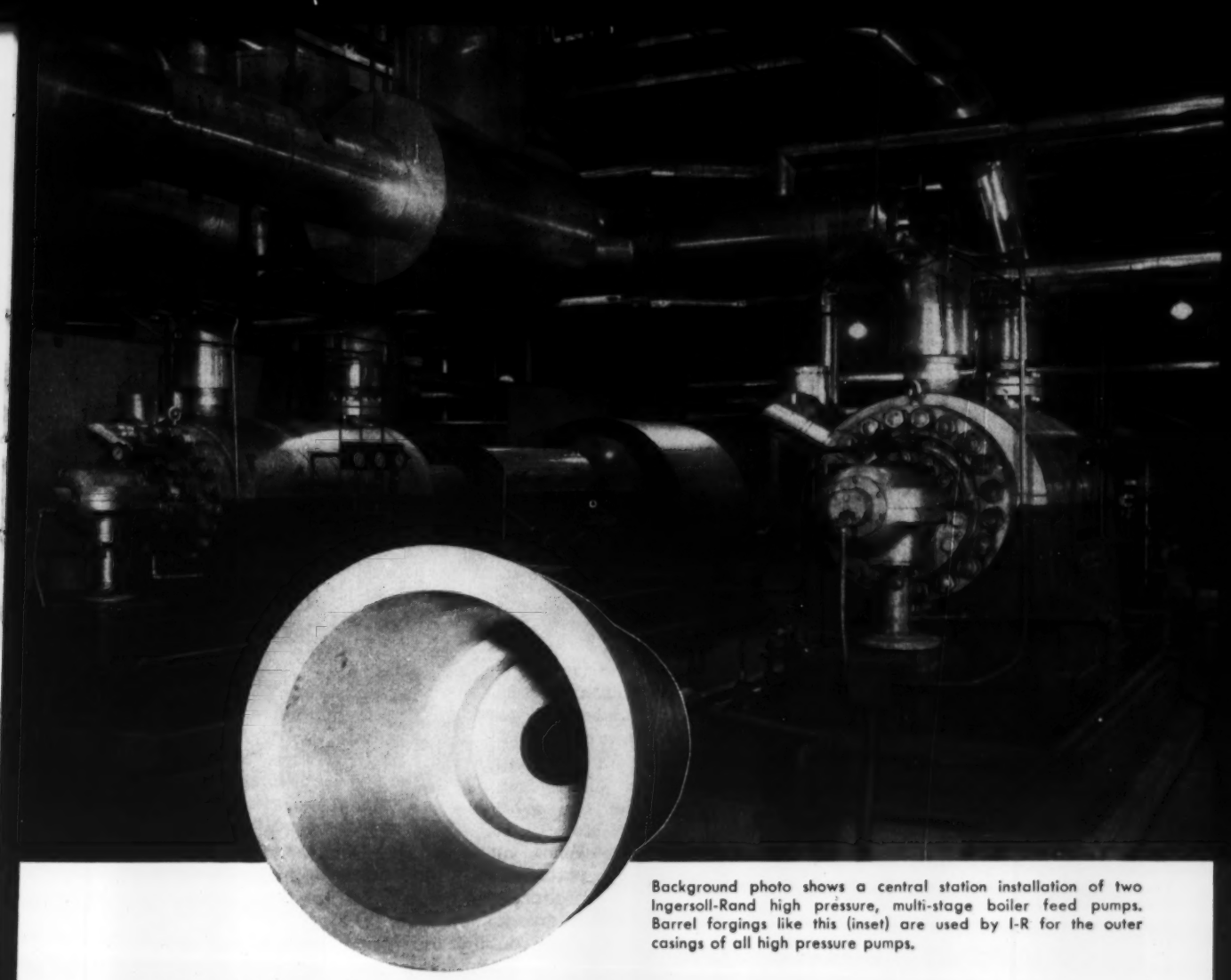
Alfred M. Heaton, 54, former vice president, **Merritt-Chapman & Scott Corp.,** New York, died Nov. 2.

Walter H. Andrews, 53, president, **Chase Steel & Supply Co.,** Vernon, Calif., died Nov. 4.

J. Laroy Perkins, vice president and a director of **Lyon, Conklin & Co. Inc.,** Baltimore, died Nov. 2.

Mack C. Lake, 64, former president of U. S. Steel Corp.'s **Orinoco Mining Co.,** died Nov. 9 in San Francisco after a long illness.

Frank J. Martin, 54, production manager, **A. W. Hecker Co.,** Cleveland, died Nov. 12 after a long illness.



Background photo shows a central station installation of two Ingersoll-Rand high pressure, multi-stage boiler feed pumps. Barrel forgings like this (inset) are used by I-R for the outer casings of all high pressure pumps.

Ingersoll-Rand tells how:

STEEL FORGINGS HELP GIVE LONG LIFE TO HIGH PRESSURE BOILER FEED PUMPS

Ingersoll-Rand Class CHTA boiler feed pumps are widely used in high pressure central power generating stations throughout the world. They are double-case units, the inner assembly containing the rotor and fluid passages and the outer casing providing the pressure vessel to enclose this pumping unit.

For service under high pressures and temperatures, Ingersoll-Rand uses steel forgings for the outer casing of these boiler feed pumps. Since Standard Steel forges these outer barrels from solid billets of high carbon steel, they have a close grained, homogeneous structure. That's a big reason why Ingersoll-Rand double-case pumps have established a reputation for long, trouble-free service with sustained high efficiency.

Very likely, you can improve *your* products by using Standard Steel barrel forgings, rolled rings, flanges or other forgings. Our engineering and metallurgical departments have helped solve many diverse problems. Please write us about yours.

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Burnham (Mifflin County), Pa.

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General Offices: Philadelphia 42, Pa. Offices in Principal Cities

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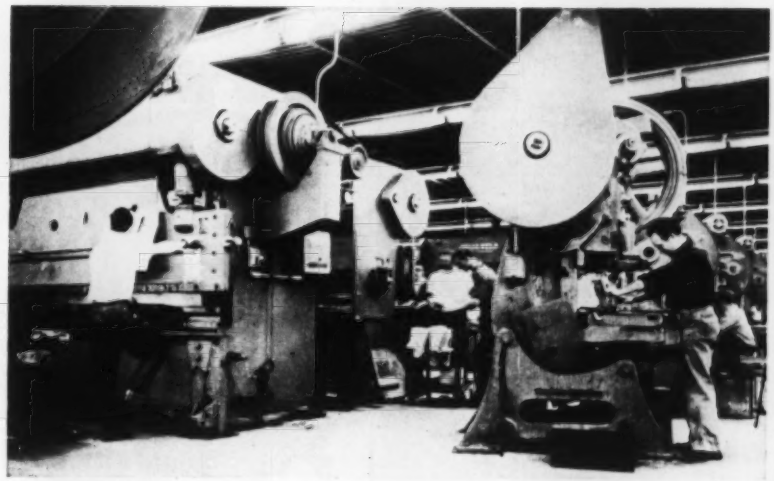


Battery of presses stamp out small steel parts in . . .

Federal Pacific's New Scranton, Pa., Plant

OFFICIAL OPENING of its new plant in Scranton, Pa., is announced by Federal Pacific Electric Co., Newark, N. J., a leading manufacturer of electrical equipment. The multimillion dollar plant is the headquarters of the firm's newly organized Eastern Switchgear Division of which E. A. Williams is manager. This is the third such division created to handle expanding manufacturing and sales activities. The plant has been in limited production for several months.

Federal now is in a position to supply a substantial segment of the $250-million annual market created by the current building boom and the increased concentration of electricity in industrial and commercial areas, says T. M. Cole, executive vice president.

Product Line—At its Scranton plant the company manufactures low-voltage, high-capacity switchgear, based on the DMB breaker, and high-voltage switchgear, based on the DST breaker. To meet eastern customer demand, the division soon will begin production of Pacific's high-voltage outdoor switchgear, together with transformers now made in California by Gardner Electric, a subsidiary.

"The generating capacity of the nation's public utilities has far outstripped the production of distribution and control equipment. The market for the latter is expected to reach new heights in the near future, and our Scranton plant will give us the facilities to meet the demand for distribution equipment," Mr. Cole says.

Activities at the Scranton plant also include the manufacture of structures and other equipment. Federal Pacific has transferred certain portions of its bus duct and motor control center assembly operations to Scranton. Standard components for panelboards and switchboards also are produced there for use in Federal Pacific's regional manufacturing plants.

E. N. Mimms Co. Changes Hands

Lau Blower Co., Dayton, O., purchased E. N. Mimms Co., Louisville, manufacturer of pedestal fans and floor air circulators. The Mimms operation will be moved to Dayton.

Foresees Pickup in Steel

A group headed by Cyrus Eaton has gained majority interest in the Portsmouth Steel Corp. through the purchase of 213,467 shares of stock. Mr. Eaton, chairman and president of Portsmouth and chairman of Chesapeake & Ohio Railway, believes the steel industry is on the threshold of a real pickup. His group's plans for Portsmouth, an iron ore and steel investment company which lists Cleveland-Cliffs Iron Co. and Detroit Steel Corp. as its main holdings, will be announced later.

Joy Mfg. Enlarges Facilities

Joy Mfg. Co., Franklin, Pa., is expanding and modernizing its facilities at a cost of about $2.5 million. The project includes two additional buildings, additional machine tools, heat-treating equipment and auxiliary equipment for materials handling.

Wire Fabricator Opens Plant

DeWire Fabricating Corp., Lowell, Mass., is now making telephone and hookup wire and wire specialties for the communications and electronics industries.

M. A. Strand Division Moves

Franklin Balmar Corp.—machine work, castings and forgings—moved its M. A. Strand Division plant from Chicago and is merging it into its Woodbury, Md., plant. M. A. Strand manufactures flexible shafting for remote control power drives and flexible shaft machines.

Armament Firm Expands

Aircraft Armaments Inc., which recently completed a 30,500-sq-ft plant in Cockeysville, Md., is erecting a 36,000-sq-ft addition. The company is a subsidiary of Hayes Mfg. Corp., Grand Rapids, Mich., and is engaged in the design, manufacture and testing of ordnance, electronic equipment and military vehicles.

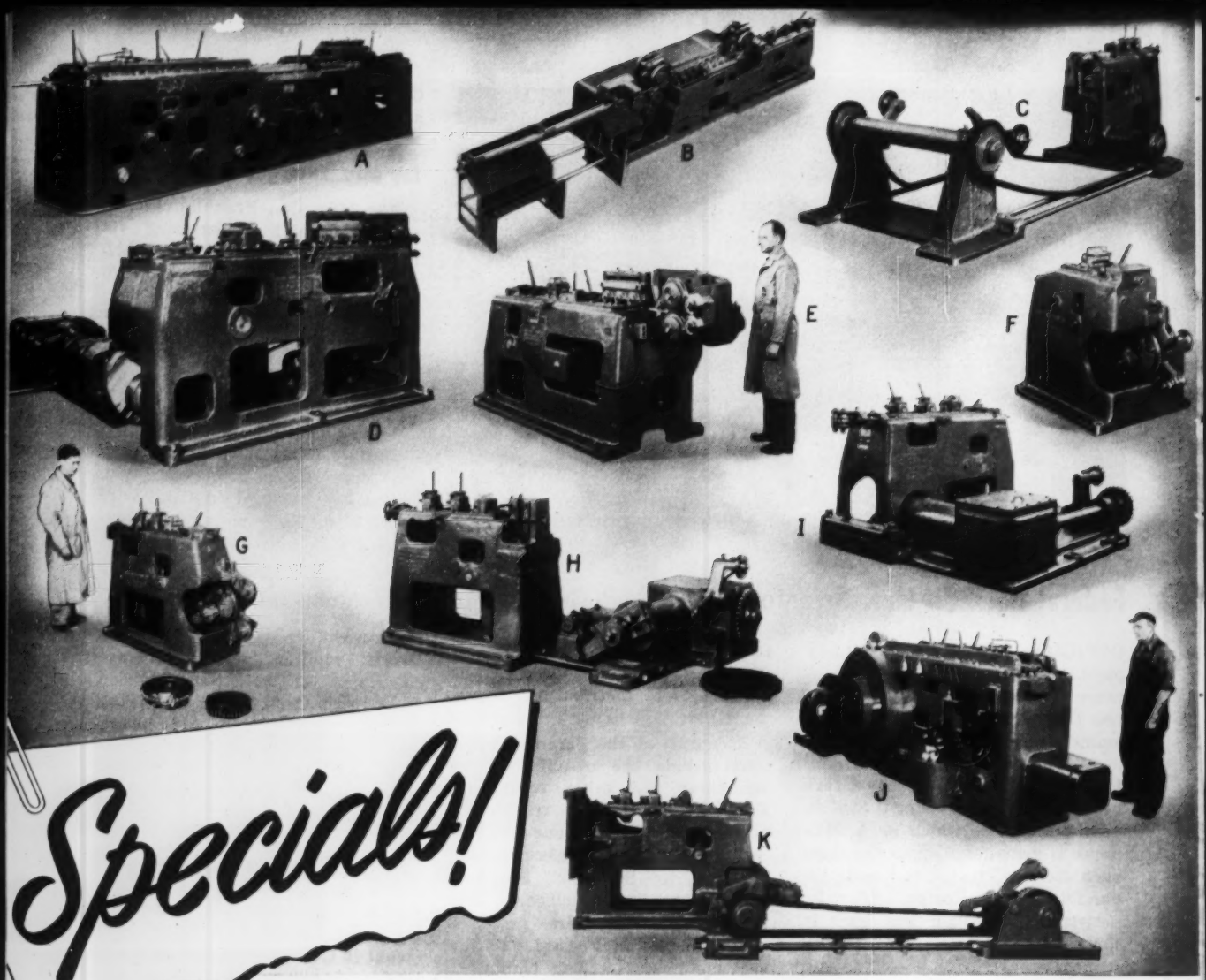
Blaw-Knox Buys Tri-Lok Co.

Blaw-Knox Co. acquired Tri-Lok Co., both of Pittsburgh. Tri-Lok makes mechanically interlocked open metal flooring (grating) in steel and nonferrous metals, and steel bridge decking.

Enters Steel Tubing Field

Aluminum Tubing Co., Jacksonville, Fla., is producing stainless steel tubing and plans to increase production to 18,000 ft a day by April. The firm, founded in February, 1953, eventually may pro-

(*Please turn to page* 72)



Specials!

In addition to a complete line of standard wire drawing and bar drawing machines, Ajax designs and manufactures special drawers to meet a wide variety of special requirements. Whether the need is for round, square, hex., keystone or rectangular section stock to close tolerances or whether the drawer is to be used in conjunction with cold headers, presses or special machines, Ajax can build it to meet the requirements and at a cost consistently low for the size and quality of the machine produced. If you have a need for drawing ferrous metals from 1010 to 52100 or non-ferrous metals with enough hardness to permit gripping, which is beyond the range of one of our standard drawers our engineers will be glad to discuss your particular requirement with you. We will be glad to send further information.

- **A** Bar Drawing and Straightening Machine
- **B** Drawing, Straightening and Cutting off Machine
- **C** for Drawing Keystone Stock
- **D** for large Waterbury-Farrel Nut Machine
- **E** for ½" Nut Machine
- **F** for ¼" Waterbury Header
- **G** for ⅜" Waterbury Header
- **H** for No. 5½ Minster Press
- **I** for Double End Spoke Header
- **J** Continuous Drawing Machine
- **K** for ⅝" Bolt Maker

THE *Ajax* MANUFACTURING CO.

Built 20 Years Ago
and
Still Going Strong

AJAX-HOGUE Wire Drawers

One of the first Ajax-Hogue Wire Drawers Built. Still in operation at the Chandler Products Corp. Cleveland, Ohio

Courtesy of Tru-Fit Screw Products Corp. Cleveland, Ohio

Courtesy of Chandler Products Corp. Cleveland, Ohio

These Ajax - Hogue Wire Drawers Have Been Drawing Accurate and Straight Wire from Coiled Rods for Cold Headers Since 1934

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Dewart Building
NEW LONDON, CONN.

(*Concluded from Page 69*)

duce more stainless steel than aluminum tubing.

Opens Pilot Plating Plant

Frederic B. Stevens Inc., Detroit, is operating a new pilot plating plant for experimental work with zinc, cadmium, copper and nickel (using automatic barrel and conventional methods). The plant also is designed for the study of metal finishing waste disposal.

IRC Buys Van Dyke Instruments

International Resistance Co., Philadelphia, purchased Van Dyke Instruments Inc., St. Petersburg, Fla., producer of precision potentiometers for guided missiles, electronic equipment for automation and atomic installations and related devices.

Newport To Make Arch Pipe

Installation of facilities for producing a wide range of arch pipe was completed at Newport Steel Corp., Newport, Ky., marking another step in the firm's product diversification program. Facilities are part of a $9-million expansion and modernization program. Major items include a new reversing hot strip mill (installed last summer) and a mill for cold rolling steel, which is expected to be in operation by early 1955.

Arch pipe, primarily used in highway drainage systems, is produced by deforming corrugated galvanized round pipe.

Allegheny Ludlum Honors Lena

Allegheny Ludlum Steel Corp., Pittsburgh, presented its Frank B. Lounsberry Award (for employees) for research to A. J. Lena, associate director of research, physical metallurgy. He received the honor for a paper entitled, "Some Surface Effects on Chromium Manganese Stainless Steels at Rolling Temperatures." R. A. Lula, research supervisor, stainless steel, and W. E. Curry, chief metallographer, were also honored as contributing participants.

Tool and Die Firm Expands

Efficient Tool & Die Co. is constructing its second plant in Cleveland. The 30,000-sq-ft facility will house a complete die and Keller model department, engineering department and die tryout equipment for large sheet metal dies, including draw dies up to 148 in. long.

Rohr Builds Plant in South

Rohr Aircraft Corp., Chula Vista, Calif., will open a plant at Winder, Ga., within the next few months to assemble power packages for the C-130, now being manufactured by Lockheed Aircraft Corp. at Marietta, Ga. Component parts of the power package will be manufactured at Rohr's Chula Vista plant and shipped to Winder.

Plans Lithium Chemicals Plant

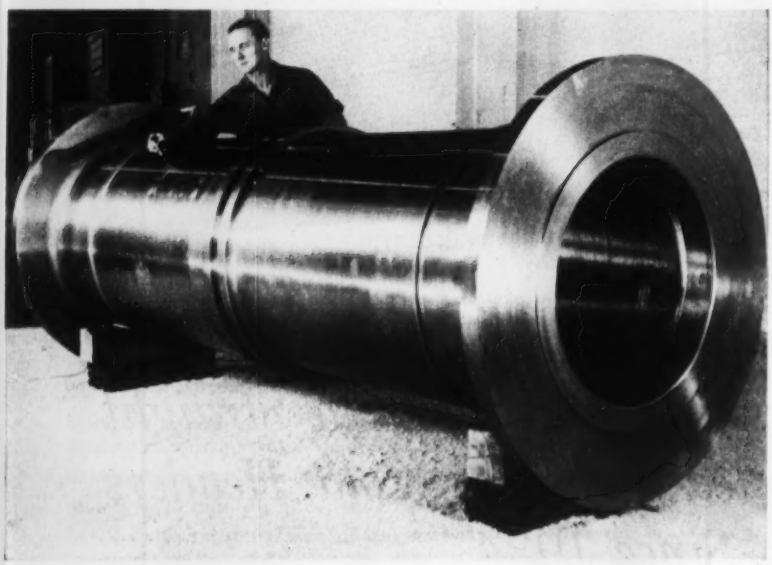
American Potash & Chemical Corp., Los Angeles, plans to build a plant near San Antonio, Tex., for the manufactur of lithium chemicals. It will be owned by a newly formed company, American Lithium Chemicals Inc. Majority stock (50.1 per cent) is held by American Potash, the balance by Bikita Minerals (Private) Ltd.

Lithium ores for the plant will be supplied by Bikita from its deposits in Southern Rhodesia, Africa. Chief stockholders in Bikita Minerals are American Potash, American Metal Co. Ltd., Selection Trust Ltd. of London and associates. Capital needs of American Lithium Chemicals Inc. and the Bikita property will be in excess of $8 million.

Lithium hydroxide will be the first material produced at San Antonio. American Potash & Chemical Corp. has produced lithium chemicals at its Trona, Calif., plant since 1934; output since 1951 has been lithium carbonate. In addition, the company has been marketing lepidolite, a high-grade lithium ore from Bikita, since the latter part of 1953.

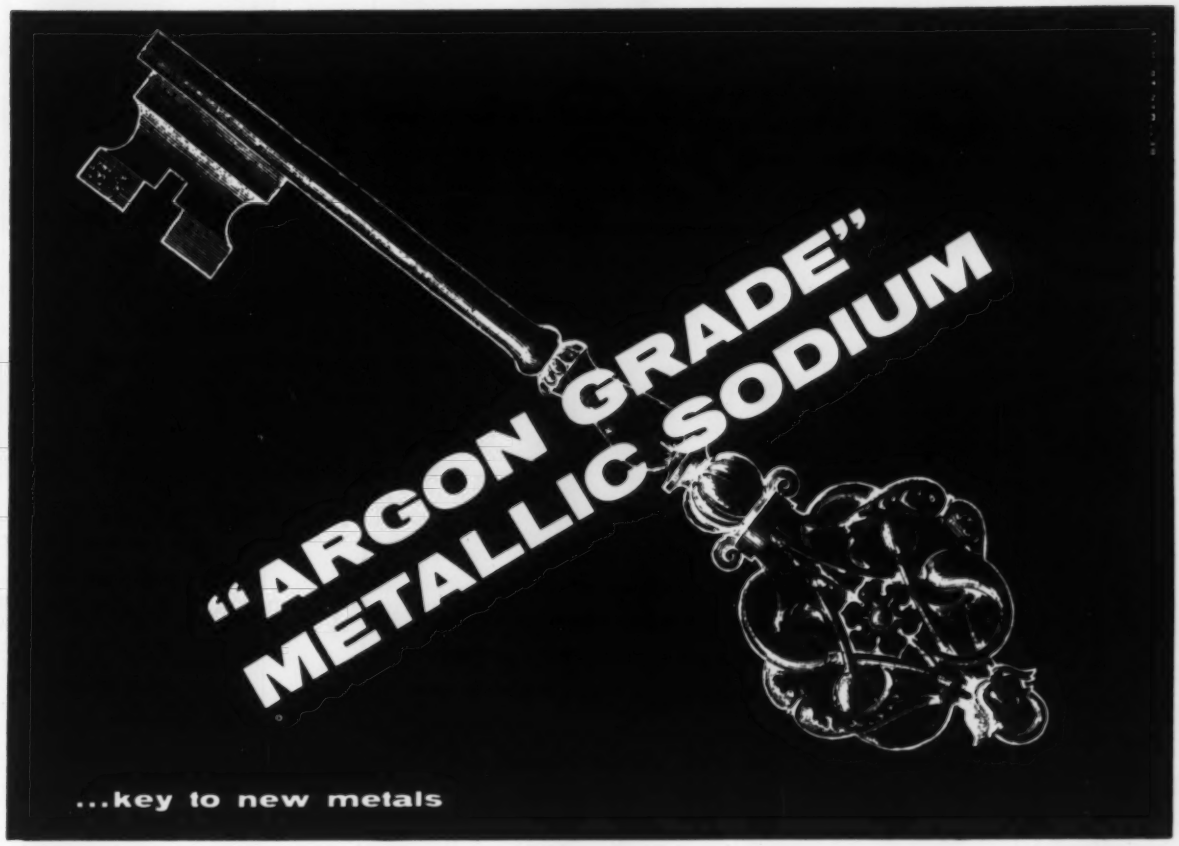
Barber-Colman Buys Hendey Line

Barber-Colman Co., Rockford, Ill., purchased Hendey Machine Co., Torrington, Conn., and will operate the property as its Hendey Machine Division. The purchase did not include manufacturing facilities. The new division will manufacture the complete line of Hendey



Camden Forge Delivers Mammoth Coupling

This 5-ton coupling hollow shaft has been delivered by Camden Forge Co., Camden, N. J., to Westinghouse Electric Corp.'s Sunnyvale, Calif., plant. Westinghouse is constructing compressors for a 2500-mph wind tunnel. The shaft is designed for use in the coupling assembly of the tunnel being built for U.S. Air Force Research at Arnold Engineering Development Center, Tullahoma, Tenn. The shaft is 36 in. in diameter and 10 ft long, with a 51 in. flange at each end



For years the metal industry has benefited by the growth of metallic sodium as a reaction tool. An early commercial process for aluminum depended on this versatile element and now the processing of stainless steel and other metals depends upon the rapid, efficient Sodium Hydride Descaling Process.

Today sodium makes possible new or improved methods for producing titanium, zirconium, silicon, tantalum, hafnium and many others. Ductile metal and finely divided metal powder catalysts can be made from metal salts and oxides.

"Argon Grade" Metallic Sodium — produced, specially filtered and packed in an atmosphere of argon gas — has been developed by engineers in our Ashtabula, Ohio plant. Sodium protected in this manner is recommended for use where traces of dissolved gases such as oxygen and nitrogen interfere with the preparation of pure metals.

This is our latest step in developing forms and grades of metallic sodium which are easy to use and acceptable for many industrial applications.

Don't overlook sodium for your processes! We offer specialized technical service on adapting sodium to your particular needs. Fill out the coupon below so that we can help you make profitable use of metallic sodium.

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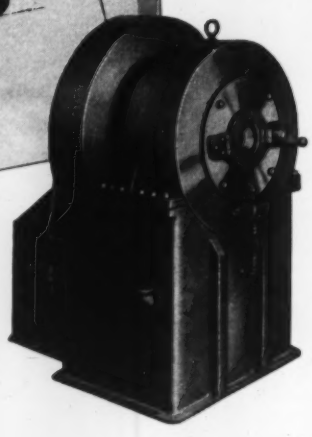
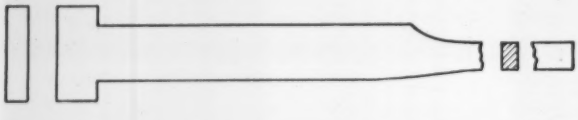
Swaging Success Stories

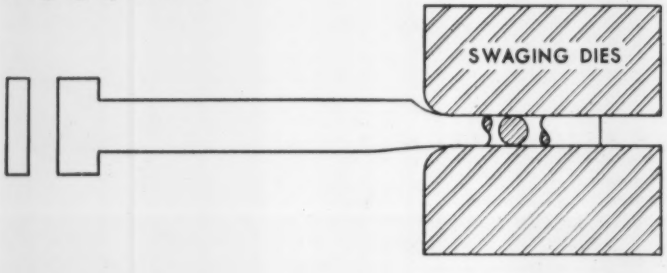


Forming and Finishing Metal Stampings —by Swaging

The application of the swaging process to the forming and finishing of metal stampings has almost unlimited possibilities. Here is an example.



Flat stampings like this one can be given rounded sections, accurately sized, without turning or grinding, by one simple swaging operation.



Can Swaging Improve Your Forming Operations?

1. Swaging is economical—no chips, no wasted material
2. Swaging is simple—can be done by unskilled labor
3. Swaging is fast—gives you increased output of special shapes

Our informative booklet on Swaging may give you other ideas for your own "swaging success story." Why not write for it today?

THE TORRINGTON COMPANY
Swager Department
150 North Street, Torrington, Conn.
Makers of Torrington Needle Bearings

TORRINGTON ROTARY SWAGING **MACHINES**

toolroom and manufacturing lathes and Hendy shapers. Manufacturing operations will begin at the Rockford plant in two or three months.

Cooper Alloy Corp. Building

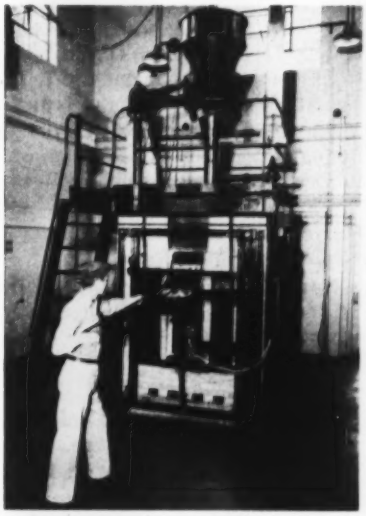
Construction work has begun in Clark, N. J., on an aircraft products manufacturing plant. It is jointly sponsored by Cooper Alloy Corp., that city, and the Bureau of Aeronautics (Navy). The building will house equipment and machinery needed to speed production of jet engine rings and other vital aircraft components.

Connor Engineering Expands

Connor Engineering Corp., Danbury, Conn., producer of air-handling equipment, is building an addition to its plant. Storage room gained will make more space available to manufacture air diffusers and purifiers.

Shipyard Enlarges Facilities

Bethlehem-Sparrows Point Shipyard Inc., Sparrows Point, Md., will expand facilities through the installation of four new tower cranes and two crane runways. The cranes will include one of 50 tons capacity, two of 40 tons and one of 35 tons, while the two run-



Tiny Oven Tests Coke

Characteristics of coke produced by different mixtures of coal under varying temperatures are tested in this novel miniature coke oven at Everett, Mass., research laboratory of Eastern Gas & Fuel Associates, Boston. Charge of 500 lb of crushed coal is loaded from hopper and leveled by operator

the A-B-C of M-S-T

A ALWAYS MAKES POSSIBLE
B BETTER PRODUCTS
C AT LOWER COST

Michigan
Electric Resistance
WELDED
STEEL
TUBING

A Quality Product

A Gasoline Tank Filler Tube

ROUND
⅜" to 4" O.D. 8 to 22 gauge
SQUARE-RECTANGULAR
½" to 2" O.D. 20 gauge
1" to 2¾", 14, 16, 18 gauge
Carbon 1010 to 1025
Michigan Tubing
has uniform strength, weight, ductility, I. D. and O. D., wall thickness, machinability, and weldability. It can be flanged, expanded, tapered, swaged, beaded, upset, flattened, forged, spun closed, fluted, and rolled. Available in a wide range of sizes, shapes and wall thicknesses, prefabricated by Michigan or formed and machined in your own plant.

For automobiles is just another of hundreds of difficult tubing fabrications manufactured in large quantities and at low cost by Michigan for its customers.

The overflow pipe is brazed to the filler tube at two points and the fastener clamps projection welded to the tube. The cam is spot welded to the tube mouth.

If you have not yet examined the possible adaptability of welded steel tubing to your product, Michigan engineers will be glad to discuss with you the many advantages of design simplification, production savings and product improvement made possible by the use of Michigan tubing.

Consult us for engineering and technical help in the selection of tubing best suited to your needs.

THE OLDEST NAME IN ELECTRIC RESISTANCE WELDED STEEL TUBING
Michigan STEEL TUBE PRODUCTS CO.
More than 35 Years in the Business
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DISTRIBUTORS: Steel Sales Corp., Chicago, St. Louis, Milwaukee, Indianapolis and Minneapolis—Miller Steel Co., Inc., Hillside, N. J.—C. L. Hyland Co., Dayton, Ohio—Service Steel Co., Los Angeles, Calif.—Strong, Carlisle & Hammond Co., Cleveland, Ohio—Globe Supply Co., Denver, Colorado—W. A. McMichaels Co., Upper Darby, Pa.—A. J. Fitzgibbons Co., Buffalo, N. Y.—Harry E. Clark & Co., Houston, Texas—C. I. Crois Co., Birmingham, Ala.

These four important factors should be considered when appraising different kinds of metal abrasives:

SPEED — Rate at which the work is performed. HARRISON Abrasives provide fast work, with effective abrading action.

FINISH — Appearance produced by the abrasive. HARRISON Abrasives eliminate the dull uneven finish of a soft abrasive.

UNIFORMITY — Close control of particle size. HARRISON Abrasives are closely screened, consistent in analysis.

COST — as a factor in the overall operation. The fast action of HARRISON Abrasives means less cost.

L/D CUT-WIRE SHOT
for use in:
Metal Blasting
Cleaning
Peening
Tumbling
Cutting
Abrading
Provides:
LONG LIFE
UNIFORM SIZE
UNIFORM HARDNESS
LOWER COSTS

These are some of the reasons why HARRISON Shot and Grit have always led the field for quality and reliability—made by the pioneers in the Metal Abrasive Industry.

Write for—latest Technical Bulletins

HARRISON ABRASIVE DIVISION
METALS DISINTEGRATING COMPANY, INC.
Elizabeth B, New Jersey

HARRISON Chilled SHOT—Diamond GRIT—L/D Cut-Wire SHOT

SUBSIDIARY OF AMERICAN-MARIETTA COMPANY

ways will each be 750 ft in length.

Librascope Builds Plant

Librascope Inc., Glendale, Calif., manufacturer of electronic devices, constructed a $550,000 plant for increased production.

Climax Uranium To Expand

Climax Uranium Co., subsidiary of Climax Molybdenum Co., New York, signed a 5-year contract with the Atomic Energy Commission to double the capacity of its uranium mill at Grand Junction, Colo.

NEW ADDRESSES

Lea-Michigan Inc., 14066 Stansbury Ave., Detroit, is at a new factory where it is manufacturing a number of Lea products used in connection with plating, polishing and buffing. Lea-Michigan is one of four companies comprising the Lea group of finishing specialists—Lea Mfg. Co., Waterbury, Conn.; Lea-Ronal Inc., Long Island City, N. Y.; Lea Mfg. Co. of Canada, Toronto, Ont.

J. N. Fauver Co. Inc., Detroit, moved its stocking warehouse and branch from Dayton, O., to 5562 Montgomery Rd., Cincinnati. T. H. Abbiati is in charge of the branch which maintains stocks of Parker fittings, hose couplings, tubing and fabricating tools; Republic valves; Tru-Flate quick couplers; and Fauver hose, couplings and clamps.

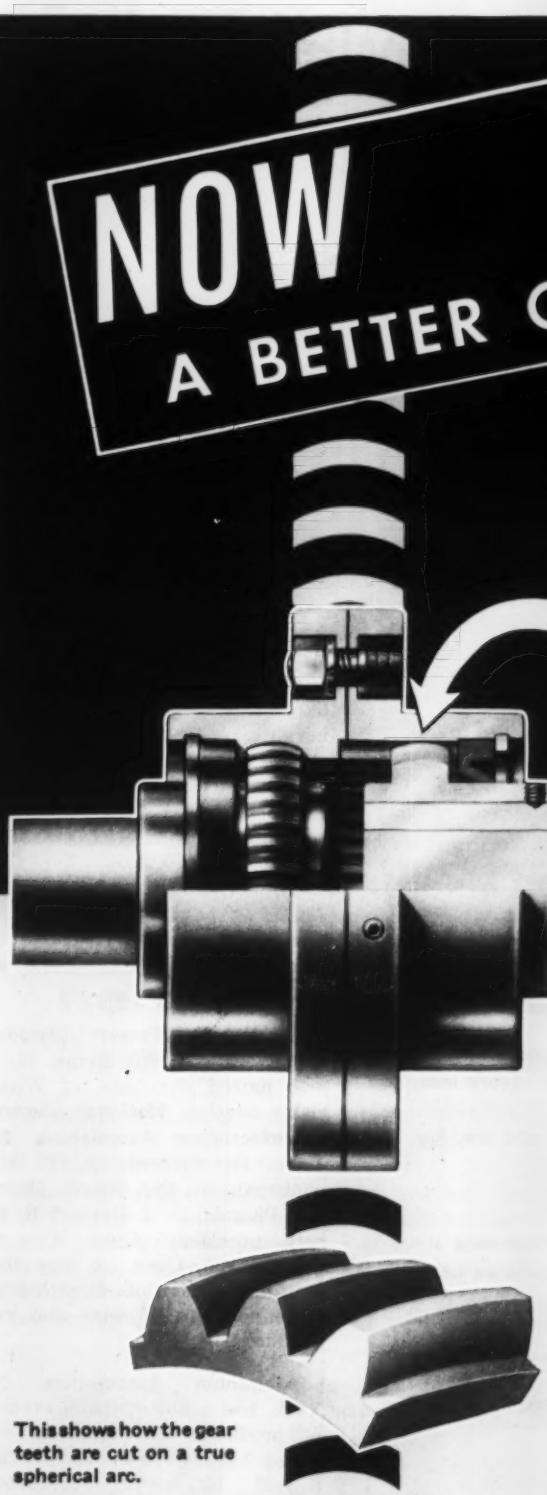
Monarch Machine Tool Co., Sidney, O., moved its Dayton, O., engineering staff to larger quarters at 346 Leo St.

Grindle Corp. moved to enlarged quarters at 15405 Park Ave., Harvey, Ill. The firm offers melting, heat treating and stack gas cleaning equipment.

George B. McMeans, vice president in charge of operations, **Kaiser Steel Corp.**, will move his offices from the company's Fontana, Calif., plant to its executive offices in Oakland, Calif., on Jan. 1, 1955. Mr. McMeans will report

NOW A BETTER COUPLING SPHEREFLEX

here's the BIG DIFFERENCE



This shows how the gear teeth are cut on a true spherical arc.

During recent years there has been a demand from the Aircraft Industry for a more flexible, stronger Gear Coupling. Although Philadelphia "Sphereflex" Coupling was developed in answer to this special need, it is now being offered to Industry in a complete line of standard, vertical and floating shaft couplings.

The "Sphereflex" Coupling utilizes a revolutionary new principle of coupling design, in that the gear teeth are precision cut on a true spherical arc. Since even the root of the gear tooth is curved, there can be no interference between mating gear teeth, even when shaft deflections range up to 7° total mis-alignment. The "Sphereflex" Coupling is in radical contrast to former methods of obtaining flexibility through excessive backlash or merely chamfering the tips of the gear teeth.

"Sphereflex" is a stronger coupling, because there is always a full line of contact between mating gear teeth, regardless of whether the coupling is flexed or perfectly aligned.

Size for size, the new "Sphereflex" Coupling will withstand more deflection, greater torque, higher rotating speeds, and more severe shock-loading than comparable couplings.

And remember, you pay no more for a "Sphereflex" Coupling than other good quality couplings.

Write for Catalog C-540.

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PLUG VALVES
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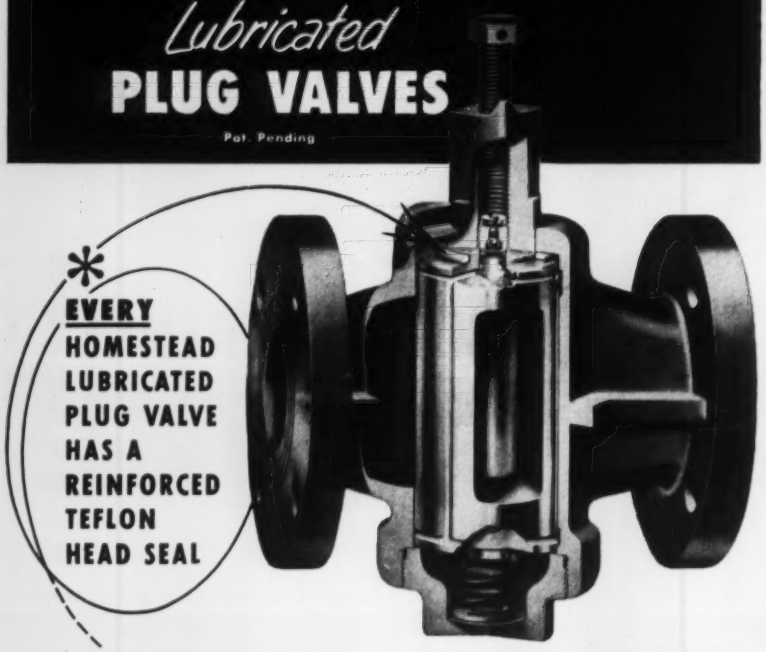

* **EVERY HOMESTEAD LUBRICATED PLUG VALVE HAS A REINFORCED TEFLON HEAD SEAL**

. . . which will not cold-flow, and which provides a positive seal against leakage—even under 200 pounds pressure per square inch, *without lubrication*.

This is only **ONE REASON WHY** you should buy and use, *low priced* **HOMESTEAD LUBRICATED PLUG VALVES.**

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1. Reinforced Teflon packing ring.
2. Completely controlled high-pressure lubricant system.
3. 100% pipe area or venturi patterns.
4. No spring torsional stress.
5. No mechanical adjustments.
6. Two lubricants handle most services.
7. Extremely close tolerance between sealing surfaces.
8. Triple head-seal with Lubricant and Teflon packing ring.
9. Plug floated on Teflon washer.
10. Leak-proof double-ball and lubricant-sealed check valve.
11. Full-threaded screw assures clean lubricant.
12. Extruding lubricant shows when system is full.

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Serving Since 1892

P. O. BOX 22 **CORAOPOLIS, PA.**

directly to Jack L. Ashby, vice president and general manager. D. N. Dagan, Fontana Works manager, will continue to report to Mr. McMeans in Oakland.

Drake Steel Supply Co. moved its Los Angeles operations to a warehouse and headquarters building at 6105 Bandini Blvd. The new plant triples office space and warehouse capacity.

Hunter Construction Co. moved its operations to 512 Elk St., Youngstown 1.

ASSOCIATIONS

Earle V. Grover, president, Apex Steel Corp. Ltd., Los Angeles, was elected president of **American Institute of Steel Construction,** New York. He succeeds John E. Jackson, president, Pittsburgh-Des Moines Steel Co., Pittsburgh. L. Abbett Post was re-elected executive vice president.

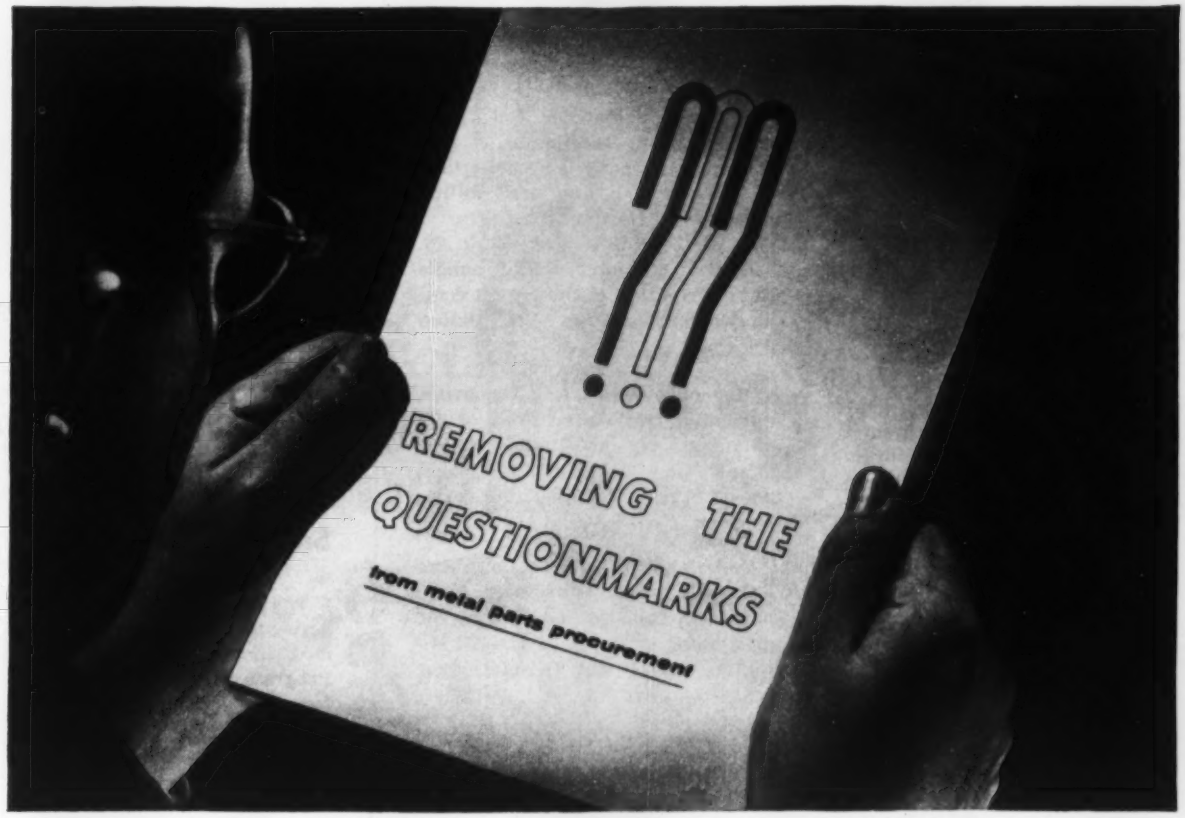
Other officers are: N. P. Hayes, Carolina Steel & Iron Co., Greensboro, N. C., first vice president; H. B. Dietrich, Dietrich Bros. Inc., Baltimore, second vice president; J. M. Straub, Fort Pitt Bridge Works, Pittsburgh, treasurer; M. Harvey Smedley, New York, secretary.

A. D. R. Fraser, president, Rome Cable Corp., Rome, N. Y., was named chairman of Wire & Cable Section, **National Electrical Manufacturers Association,** New York. He succeeds A. F. Metz, chairman of the board, Okonite Co., Passaic, N. J. Herbert B. Bassett, president, Acme Wire Co., New Haven, Conn., is vice chairman of this section. It includes 33 manufacturers of wire and cable products.

Aluminum Association, New York, has a new division made up of producers of aluminum wire, rolled bar and rod. R. W. Goss, Scovill Mfg. Co., Waterbury, Conn., will serve as its chairman.

National Tool & Die Manufacturers Association, Cleveland, elected Jerome H. Stanek president. He is vice president of Stanek Tool & Mfg. Co., Milwaukee. Other officers are: J. N. Huser, B & H

specific ways to increase profits thru metal stampings



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Are you faced with rising costs and stiffer competition? How certain are you that your metal parts embody all possible improvements and economies?

"Removing the Questionmarks" will tell you how The Crosby Company is staffed and equipped to help you solve numerous problems in the procurement of metal parts. It shows how this progressive Company can assist both large and small plants in the design and production of cost-saving, product-improving, metal stampings.

It defines the many ways in which Crosby shows its initiative by making suggestions and recommendations when quoting. It explains how estimates are carefully prepared and how delivery dates are made to be kept.

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Specialty Co. Inc., **Indianapolis**, first vice president; Herbert Harig, Harig Mfg. Corp., Chicago, second vice president; Harold G. Murdock, Arrowsmith Tool & Die Corp., Los Angeles, secretary; P. R. Marsilius, Producto Machine Co., Bridgeport, Conn., treasurer.

Orello S. Buckner, president of Bay State Abrasive Products Co., Westboro, Mass., was elected chairman of the board of directors of **Grinding Wheel Institute**, Cleveland.

Jack C. Malugen was elected president of **Service Tools Institute**, New York, for the 1954-55 term. Mr. Malugen is president of J. H. Williams & Co., Buffalo, manufacturer of industrial and automotive wrenches, tools and drop forgings.

REPRESENTATIVES

Riehle Testing Machines Division of **American Machine & Metals Inc.**, East Moline, Ill., appointed Size Control Co., Chicago, agent for Riehle portable hardness testers for Iowa, northeastern Indiana and northern Illinois. An item published on page 128 of the Oct. 25 issue of STEEL incorrectly stated that Size Control and its affiliate, Wacker Sales, "were appointed exclusive agents" for the testers. The new appointment enlarges Size Control territory. The company also represents Riehle in Wisconsin and Minnesota through subagents.

United States Hoffman Machinery Corp.'s Air Appliance Division, New York, appointed T. R. Christy Co., Milwaukee, as its representative in that territory. The division makes heavy-duty industrial vacuum cleaning equipment, pneumatic conveying equipment, continuous strip drying equipment, centrifugal compressors and vacuum producers.

Ready Tool Co., Bridgeport, Conn., announces the following distributor appointments for its centers, grinding and milling machine dogs: Gierston Tool Co. Inc., Elmira, N. Y.; Englewood Mill Supply Co., Englewood, N. J.; Motch & Merryweather Machinery Co., Cleveland; A. N. Nelson Inc., Kearny, N. J.; Sidney B. Roby Co., Rochester, N. Y.; A. N. Nelson Inc., Brooklyn, N. Y.; Sterling Supply Co., Ferndale, Mich.; Syracuse Supply Co., Syracuse, N. Y.

Scharmann Machine Corp. was organized by Scharmann & Co., Rheydt, Germany, manufacturer of horizontal boring and milling machines. Headquarters are at 305 W. 72nd St., New York 23. The new corporation will handle the distribution of the parent company's products in the United States.

Reynolds Metals Co., Louisville, appointed two distributors of its aluminum pig and ingot: Globe Metals Co., Oakland, Calif., and Aaron Ferer & Sons Inc., Los Angeles.

American Gilsonite Co., Salt Lake City, Utah, appointed Freemire & Associates Inc., Baltimore, distributor in the Baltimore-Washington district for Gilsulate, the triple-zone system for hot, underground pipes.

Allis-Chalmers Mfg. Co., Milwaukee, appointed as distributors: Wheeling Rubber Products Inc., Wheeling, W. Va., for its V-belt drive equipment; Caskey Engineering Co., Seattle, for its motors and control equipment.

Hauck Mfg. Co., Brooklyn, N. Y., manufacturer of industrial oil and gas-burning equipment, appointed Leonard J. Shorek as its Detroit representative.

New York Belting & Packing Co., Passaic, N. J., appointed Woodbury & Co., Portland, Oreg., distributors for the state of Oregon.

Size Control Co., Chicago, gage and lapping machine manufacturer, appointed Bill Wepfer, Little Rock, Ark., as representative for Arkansas, Mississippi and southern half of Louisiana.

Insul-Mastic Corp. of America, Pittsburgh, licensed Waugh-Morrison Co., Kingsport, Tenn., to sell and apply the heavy asphaltic protective coatings made by the firm.

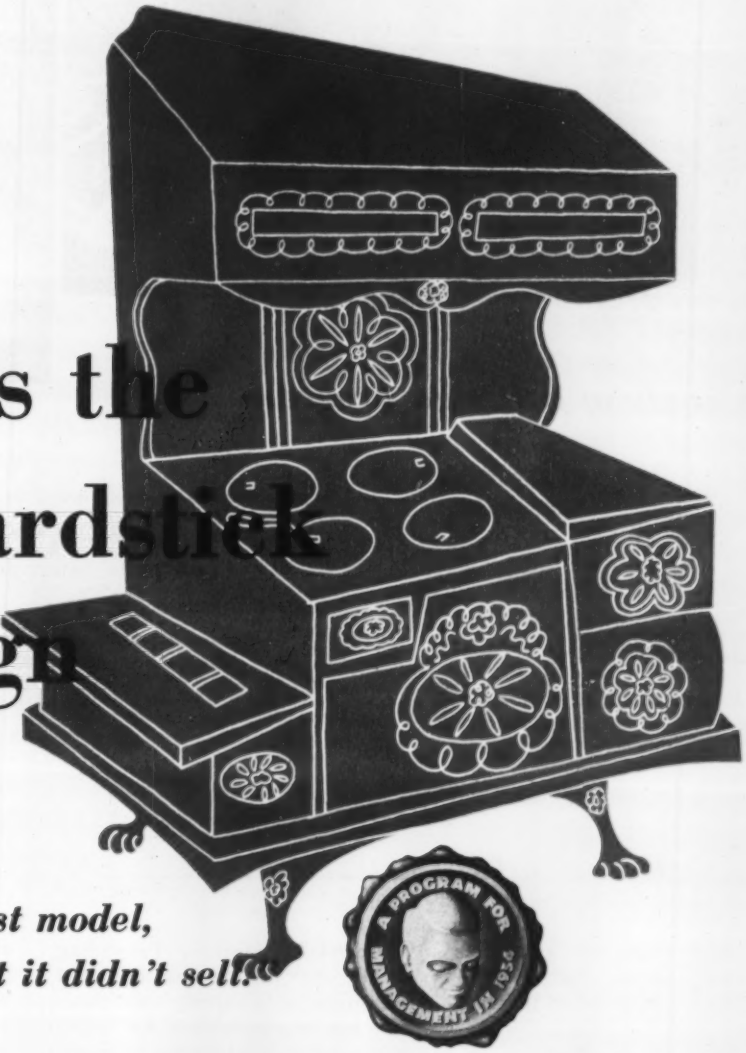
10

STEEL's 1954 Management Series . . .

The editors of STEEL herewith present the tenth in their ten-part series, Program for Management for 1954. The complete list:

1. **Now You Have To Sell** (Feb. 22, p. 91)
2. **Build Better Bosses** (Mar. 22, p. 81)
3. **Automation—How Far Should You Go?** (Apr. 12, p. 87)
4. **Stabilizing Production, Employment** (May 17, p. 87)
5. **Integrate Your Distribution** (June 21, p. 113)
6. **Personnel in Distribution** (July 19, p. 91)
7. **Transportation in Distribution** (Aug. 23, p. 89)
8. **Product Diversification** (Sept. 13, p. 113)
9. **The Foremen—Make Them Managers** (Oct. 11, p. 103)
10. **Product Design**

Profit Is the Real Yardstick of Design



"It was our best model, but it didn't sell!"

Designers love that story. It gives them a chance to point up a basic truth: Whether your product is stoves or staples, design has to click with the customer or your company is in for a lot of grief.

Then and Now—Until recently, design was taken for granted. "If we make the best product we know how, people will buy it," used to be the underlying principle. Then someone discovered that the best product sold better when it was made more attractive to prospective customers. To call on the classic example, the man who built the better mousetrap soon found that competition forced him to make it more salable. *Better* and *more salable* are not synonymous, he discovered.

Today, you expect to hear your sales manager say: "Acme is coming out with a new model that's really going to hurt us. Let's take a critical look at our *design.*" Or the chief engineer will report: "By changing the *design* like this, we can save a cent and a half per unit and make them faster."

Both are talking about the same thing. One sees design as the tool that puts customer appeal into the product; the other sees it as a step toward production savings. From these different approaches stem the two types of design problems: 1. Design for making. 2. Design for selling. In the finished product, both can work for or against the product's success. Of course, their relative importance depends upon the product.

Coming of Age — Design has been elected to a full partnership in company operations. Management has found that well balanced design organizations co-ordinate the best efforts of those specializing in the making and selling features of the product.

Who makes up that organization? How does it function? There are just about as many answers as there are products on the market. Design is an intangible that defies hard and fast

(1)

(2)

(3)

Case Study of a Design Program

CLASSROOM FURNITURE

Fig. 1—First meeting of the design force brought together men from Brunswick-Balke-Collender's design engineering staff and representatives of consultant designer, Dave Chapman. Objectives and course were plotted.

Fig. 2—Next came general research involving architectural, orthopedic and educational studies. Other topics, such as distribution, market and functional requirements of the product, had to be understood.

Fig. 3—First rough model started as result of analysis of materials, standards, engineering and production methods. Cost estimates indicated that either stamped or rod construction was feasible. Design data favored tapered tubular steel for legs, and first prototypes were made

Source: Society of Industrial Designers 1954 Yearbook

rules. The ideas and principles are fairly constant, but application poses a new problem in every instance.

Organizing the Program

There's nothing really mysterious about designing a good product. Too many people have the mistaken impression that designs are born on the drawing boards or clay mockup tables of a handful of gifted geniuses.

Actually, the matter is fairly routine. Without going outside your plant, you have at your disposal about 90 per cent of an effective design team. They are the experts in production, methods, testing, application and sales. Often one man will perform several functions. In simplified form, here are the men who should be on your team:

Project Engineer — Depending on the size of the company and the products involved, this function can be performed by a top management, engineering management or production management man. He directs the whole operation, sets timetables and makes sure objectives are being met.

Designer — He's the man who puts the team's ideas on paper. Responsibilities include making layouts and detailed sketches, keeping all data and calculations.

Methods Engineer — This man should be your expert on tool analysis and parts processing. He decides whether parts can be made as designed and makes all cost estimates.

Product and Production Engineer — Big responsibility of this man is to see that the design incorporates as many standard, proved parts as possible and that it allows for proper service life and maintenance. He also performs the evaluation of competitive products and establishes testing procedures for the new product.

Test Engineer—It's up to this man to apply the test program, evaluating the product not only from the customer standpoint but also for its ease of inspection on the production line.

Application Engineer — This member of the team accurately reflects customer needs and requirements, trends in the trade and salable ideas from the field. He's there to see that such points get into design.

Industrial Designer—Here's the expert that not too many firms can afford to hire permanently. His job is to make the product appealing, establish its character and make it convenient to use. Often he brings in fresh approaches and cost-cutting ideas.

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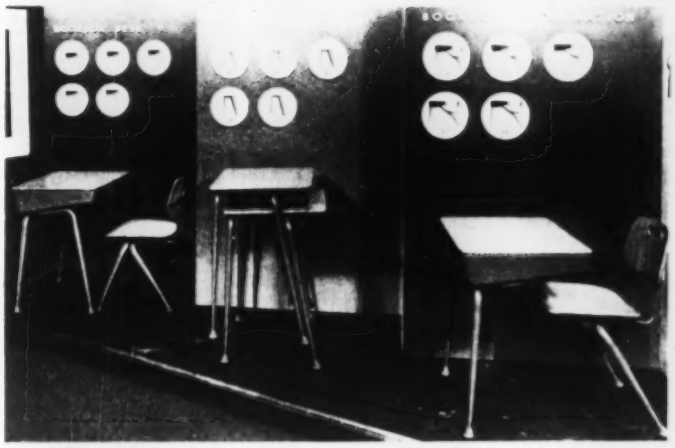


(6)

by hand. Several assembly techniques and support arrangements were under consideration.

Fig. 4 Further design refinements were made. Emphasis was placed upon function of the units with respect to needs of educational systems. Children were brought into the plant to make a "live test" of their reactions to the furniture.

Fig. 5 Prototypes of the line were presented to management and later to sales personnel. Based on their comments, further refinements were made and the range of the entire line was established. Six months had elapsed since the first meeting.

Fig. 6 The Chapman office prepared design and production detailing for the line's first public showing at a trade exposition.

Who Rules?—Whether one man or a dozen perform each function depends on the scope and complexity of the program. In a small, one-product company, a handful of men can do the job.

Regardless of company size decisions must be made by top operating executives. If that responsibility falls on you, you've got to have a pretty good understanding of what makes a good design. Sure you can hire an able consultant or full-time specialist to help you make decisions, but you'll get best results if your own design IQ is up to par. Start by looking at your own product like you had never seen it before.

Ideas at Home—One metalworking executive keeps a receptive ear for suggestions from employees. "We rarely get an idea that is new to our design or engineering boys," he admits, "but every once in a while one pops up that starts us thinking in a fresh direction."

Let engineering analyze some of those ideas for improving manufacturing processes. More than one product redesign has been stimulated through such offhand research.

Ideas from Sales — Potentially, the sales force holds a wealth of design information. The problem is to get concrete and usable information instead of trade gossip. Some have found a required weekly report on customer and dealer opinion works to advantage. It may suffice to have the salesman report only on reaction to new models or on customer complaints or suggestions.

One company with an extensive dealer organization maintains a steady flow of suggestions from that source once they made it clear that someone in authority reads them. Useful reports from retailers are hard to get since they handle many different brands.

Customers, Too — Suggestions from customers fall into a different category. Few design ideas ever come from this source, but their reactions provide a lot of raw material for design. Consumer opinions reflect what they want and need.

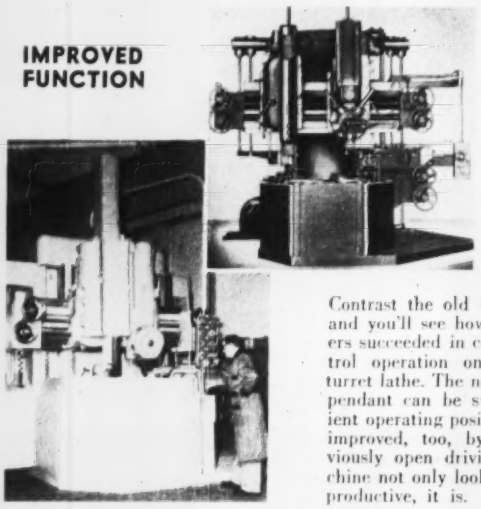
Several years ago when a large refrigerator manufacturer polled housewives on how they liked high legs on refrigerators, the answer came back: "Fine, they make it easy to sweep under the cabinet." Taking this lead, the company's designers carried refrigerator walls right to the floor to eliminate the sweeping problem.

Check Competition—This may sound like a needless suggestion, but there is danger. Too often watching competition leads to imitation. "Acme is using more chrome; we better do the same"

What Makes a Successful Design?

How well it achieves its original goals, is the best measure. And they can vary all over the lot. Here are three examples. Keep in mind, however, that a single product design may have all three of these goals and even more.

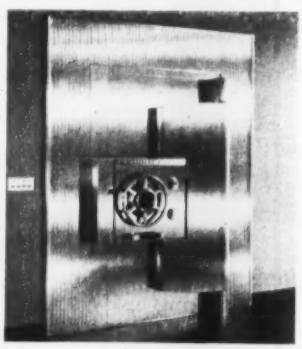
IMPROVED FUNCTION

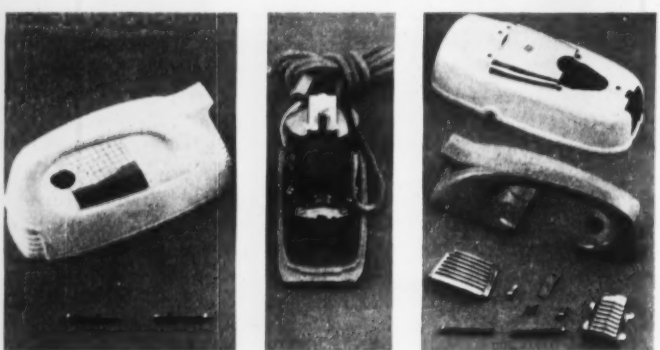


Contrast the old (inset) with the new and you'll see how Bullard Co. designers succeeded in centralizing every control operation on their new vertical turret lathe. The newly-designed control pendant can be swung to any convenient operating position. Appearance was improved, too, by enclosing the previously open driving mechanisms. Machine not only looks more accurate and productive, it is.

APPEARANCE

Vault doors have always been massive appearing—bankers felt they lent a substantial air to their business. But with banks going modern, designer Henry Dreyfuss was called upon by Mosler to do the same for vault doors. All the design labor isn't in the styling, however. The all-welded construction reduces delivery time, and the completely sealed-in working parts eliminate the need for periodic dust removal and maintenance.





REDUCED MANUFACTURING COST

With a bit of redesign effort, GE's small appliance division at Bridgeport, Conn., trimmed some 40 cents off the assembly cost of this mixer unit. In the center is the power package to be enclosed. At the right are the ten parts that used to make up the housing; at the left, the one-piece molded housing with two connecting screws. The new design is better looking and easier to wipe clean, too.

or ". . . they're coming out in colors; we ought to follow along," should never be reasons for tampering with a successful design.

Your budget for research and development should provide funds for studying all competing products. And don't forget to let your patent experts sit in on analyses by sales and engineering. Don't try to compete with a competitor's specialty. Concentrate on features he isn't promoting.

Suppliers Help—Your materials and component suppliers have research and technical personnel who are anxious to advise you on the best and newest uses of what they sell. The service is usually free and helpful, but it's well to remember that vendors have a sales motive. Study each suggestion carefully.

Continuing Program—Research, advertising, marketing, even cost accounting, can often add immeasurably to the knowledge of your products and pinpoint ways of improving them.

These are the design wheels that should always be in motion. When they are kept so by management encouragement and direction, you'll have the basic information that will prevent your ever being pushed into a design change by your competitors.

Executing the Program

Knowing when to shift into high gear on a design program is just as important as knowing how. Timeliness is a profit-paying virtue.

If you introduce new models annually, you have a natural design deadline. But few industries are pressured with yearly or even established changeover patterns. Most design timing is involved with such things as amortization of tooling, industry-wide rerating, technological advances and competitive positions.

Don't pass up your distributors' opinions on new model timing. They're often in an excellent position to see cycles taking shape.

Build a Schedule — Understandably, you can't wait until the week or even the month before the prod-

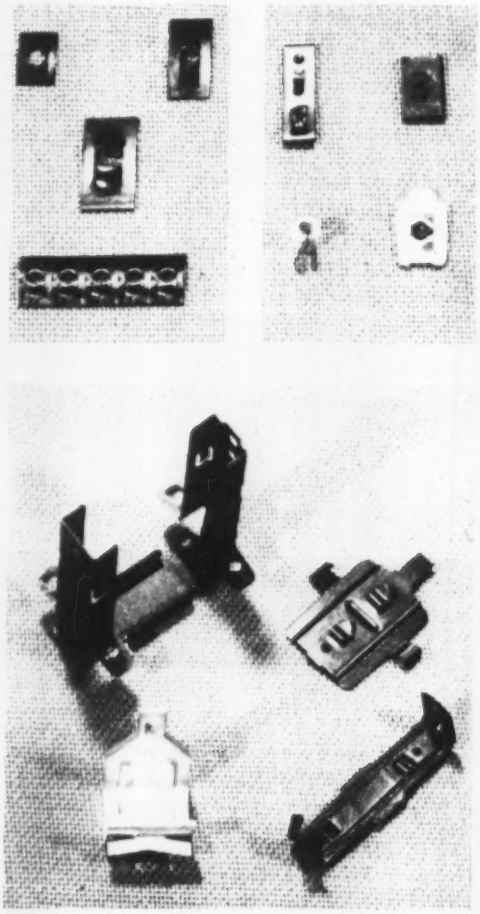
Evolution of a Design

NOT TOO MANY YEARS AGO, when Tinnerman Products Inc., Cleveland, was still in the stove business, it developed a little fastener that helped overcome the problem of crazing when bolting porcelain enameled parts. The design worked so well that eventually Tinnerman quit the stove business to devote full time to the demands of fastener customers.

Pictured upper left are several adaptations of the speed nut that started the evolution. They provide both an inward thread lock and an arched spring lock when the screw is tightened. Making them in strips cuts handling of small parts.

But a good many customers wanted self retention incorporated into the basic design. Three varieties of these fasteners are shown upper right—"U" and latching type speed nuts and a tubular type speed clip for unthreaded studs. These eliminate a lot of costly positioning operations and permit front mounting in blind locations.

The next step is obvious. With a little ingenuity, Tinnerman designers combine structural and fastening functions to save materials and reduce assembly time; they also eliminate an average of five parts per application.



uct release date to shift your design program into high. How much lead time do you need? It will vary with the number of products in the program and the design complexity of each.

Set up a schedule for each one, providing dates for new idea decisions, experimental models, testing, engineering studies, new tooling and so on through all the pertinent steps. Make deadlines realistic. If they're set too tight, they breed trouble and confusion.

Add up the total time required, and that's your design lead time. This constant figures in every equation.

Set the Objectives — To almost every design program there are both short and long range objectives. Warner & Swasey, Cleveland, for instance, was coming out with a new automatic single-spindle chucking machine not long ago. Short range, the objective was to boost the workpiece capacity of an existing model. But long range, the objective was to achieve a design that would enable them to add future members of the line and still maintain a family resemblance.

Or a more complex example would be the introduction of the first of a line of products, such as garden tools, where, despite dissimilarity, a family character is to be maintained. Short range objectives should concentrate on benefiting the customer, which, in turn, will bring about long range benefits to your company.

Research and Interpretation — With objectives detailed as completely as possible, your research staff and the consultant designer (if you've retained one) dig into every possible source of market, process and product information. It's at this point that all ideas, complaints and competitive slants gathered by your continuing program come into play. Add them to the rest of the data, and your team

Materials Selection and Design

PRICE AND AVAILABILITY of materials are often misleading criteria for selection of the best material for the design. A cost edge at the buying end can disappear quickly if that same edge doesn't hold up through production stages.

Best practice is to make a rough design of each part as it would have to be made from each material. Price and amount of material required to do the job then can be easily estimated.

Certain of the materials will eliminate themselves early in the consideration. Submit the remaining contenders to the following comparison test:

	MATERIALS			
	A	B	C	D
What are primary costs of equivalent quantities?				
How much will it cost to form the desired part?				
What about assembling or joining costs?				
How do they stack up under these market intangibles?				
Lightness				
Appearance				
Corrosion Resistance				
Ease of Maintenance				
TOTALS				

is ready for its first big session.

Interpreting research data establishes direction to the program. In some cases it even changes the direction. A small appliance maker had just about made up his mind to enter an established market, but research figures convinced him he couldn't compete so he concentrated on improving his existing products. This won't happen often at this stage, but keep your thinking flexible until complete meeting of the minds is achieved.

Narrowing the Field — With direction established, pursue a number of alternate courses. General Electric recently told its design staff to eliminate the "tombstone" appearance common to all refrigerators. One group went off in the direction of horizontal arrangement with the cabinet hanging on the wall. This radical departure will soon be making its way into your kitchen, if your wife has her way.

If appearance and convenience of use are important, (even apparatus builders are beginning to recognize that they are) your industrial design department or consultant should play an important role here. This is especially true when mockups of the several alternates are in the talking stage. Product and industrial designers working together can produce some amazing successes.

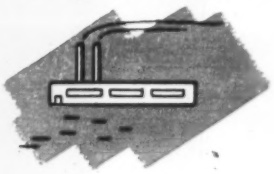
Final Decision—In a well executed program, decisions are not so difficult as might be supposed. Mockups and working models usually uncover advantages and disadvantages to the extent that the final yes or no need not be an arbitrary one.

Naturally, top management makes the decision, but not without the help of the whole team. Be sure that each department makes its report, detailing each alternate choice. In many cases, economics will be the deciding factor; however, don't veto an appealing design for one that is mediocre and slightly less expensive. More often than not, you'll find that a cleaner appearing design offers savings too.

Not Through, Yet—Like a powerful golf swing, a design program has to have follow-through. After management says: "This is it . . . this is the product that's going to

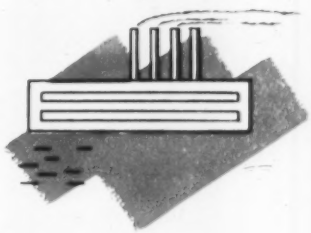
What Kind of Design Setup Do You Need?

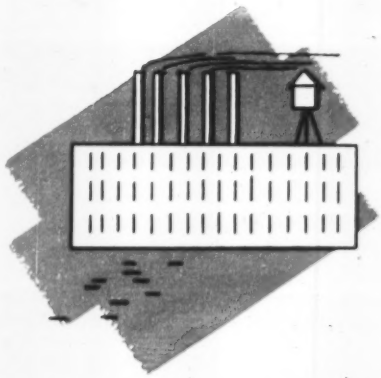
IF YOUR BUSINESS IS:



SMALL There are a great number of companies which produce a single product or a short line that does not change often. Best working arrangement is to retain a competent consultant designer on an annual basis. He and his staff get to know your problems by a continuing relationship, and they're available at all times for advice and counsel. Specific jobs are negotiated under separate terms.

MEDIUM When your product lines are broader, you can usually afford a small, full-time design staff for handling minimum work loads. When peak load conditions arise, an outside consultant is usually called in to work with your design staff on particular problems.





LARGE Most large companies, with their wide diversity of products, have complete internal design staffs, including model shop facilities. These staffs are virtually independent of outside help. There are times when a spot injection of outside viewpoint or experience is warranted. The big company can then get the benefit of the best thinking in the design profession without continuing expense to the payroll.

In consumer goods organizations, industrial design should be independent of the engineering function but at the same level. For industrial products the design function might well be a part of engineering. When consultants are called in, they should work side by side with the existing staff and not independently at a higher management level.

sell" comes a period of fine-tooth combing. With the whole group free to concentrate on one design, encourage them to really apply their talents.

Minor revisions may have been discussed at the time of the final decision. Perhaps some reassessing of values was suggested, putting more emphasis on service life and less on ease of maintenance, for example. This is the time for the experts to get their last design licks in before drawings go to tooling.

End of the Line—When that day comes, your design group may feel that they're through with the program. And in too many cases, they are! Tooling views design drawings as the final word and acts accordingly.

You're passing up potential savings if your design follow-up doesn't include a period of close liaison between Design and Tooling. In practice, the tool engineer can readily spot places where an additional positioning lug on a part can eliminate an expensive jig. Conversely,

Co-ordinating Industrial Design and Engineering Design

Mr. Muller-Munk

"No matter what the product is—lathe, refrigerator, printing press or electronic computer—in the end there are always human beings who will use and operate and react to what has been provided.

"It is the design engineer's responsibility to guarantee the product in terms of its operating and mechanical performance. It is the industrial designer's responsibility to guarantee their appreciation and understanding by the user.

"The opinion is still sometimes heard that the industrial designer's work consists of unnecessary additions to otherwise self-sufficient solutions. No honest industrial designer will be satisfied until he has convinced himself and the engineers with whom he is working that his suggestions can be accomplished within terms of mechanical and manufacturing economy.

"Dividing line between the industrial designer and the design engineer is often faint indeed, and for jointly developed projects it would be fallacious for either profession to claim full credit when it should be given to both."

—PETER MULLER-MUNK
President, Society of Industrial Designers

one of his suggested shortcuts may not hold up when weighed against its effect on the whole product.

Evaluating the Product

Chronologically, this is not the place to be evaluating the product. The program itself is nothing but a series of evaluations, sandwiched between design steps. But the discussion up to now has concentrated on the latter to explain better the mechanics of design.

The way to measure your product's effectiveness is to look at it from your own and your customer's viewpoint. You want it to be something that will sell, earn the best profit and satisfy the customer so he'll buy his next one from you. Your customer wants to satisfy his need with the product that is easiest to use, lasts longest and is most reasonably priced.

Will It Sell?—Think how many times you see an illustration of a new product before you see the real thing. How many times do you form an unfavorable opinion? You judged largely on appearance; so do your customers! A product not only has to be good, it has to *seem* good to make one lay down his money and say, "I'll take that one."

When a designer says a product has good appearance, he's talking about more than beauty or styling. Appearance involves simplifying the complicated, making the function obvious and dramatizing the convenience of use. Color and streamlining are important too, but only after the fact.

One maker of power tools for home workshops confesses that a tremendous number of sales are made because ". . . our tools look so handy and easy to use the buyer can't resist." His sales prove the point.

Back for More—Price and appearance may have sold your customer the first time, but your product design is what will bring him back. Assuming your design performs its intended function, service and maintenance hold the return order key. Here are some tips:

Design for the heavy-handed . . . the large-thumbed knob twisters who can be counted on to abuse your product. Keep maximum service life in mind, but locate service adjustments handily and avoid the need of special tools. Design out sensitive adjustments that can't be locked during shipment or any other likely sources of shipping damage.

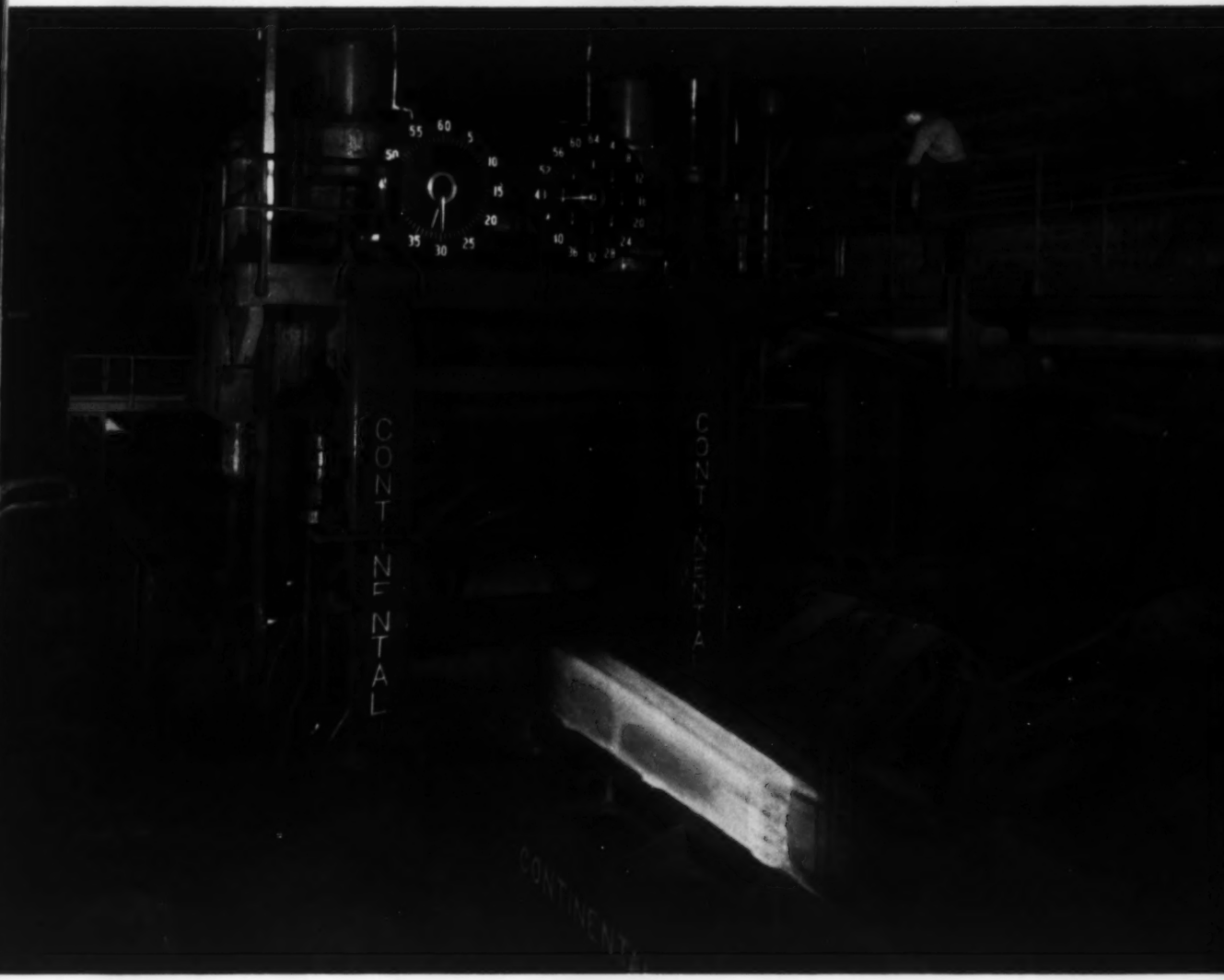
The Best Profit—How economically you can put your design's salable features together in the finished product gives you the only conclusive test of the program.

Good parts design is one of the best places to trim a penny here, a penny there. Knowledge of the latest materials and finishes is a must. Your product engineer will certainly fight for as many standard parts as possible and for a minimum of machined tolerances, too. Your methods engineer knows how to keep costs down with use of subassemblies.

All of which re-emphasizes the fact that some of the most important design functions rest in the hands of men already on your payroll. Co-ordinate them and you'll have your design for competition.

CONTINENTAL

46-inch HIGH LIFT BLOOMING-SLABBING MILL



Producing Per Schedule

This mill has been producing per schedule ever since the installation was completed. Continental builds blooming-slabbing mills in a complete size range, offering twin-motor or pinion-stand drive, high-speed screw-downs and manipulators, plus other features designed for your specific needs. Continental also designs and manufactures universal, plate, hot strip, cold strip, temper, structural, rail, billet, rod and merchant mills. Continental service is complete from preliminary engineering to satisfactory operation, with all auxiliaries.

- COMPLETE ROLLING MILLS
- ROLLS • ROLL LATHES
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- SPECIAL MACHINERY
- STEEL CASTINGS • WELDMENTS
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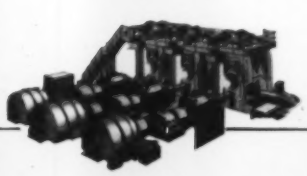

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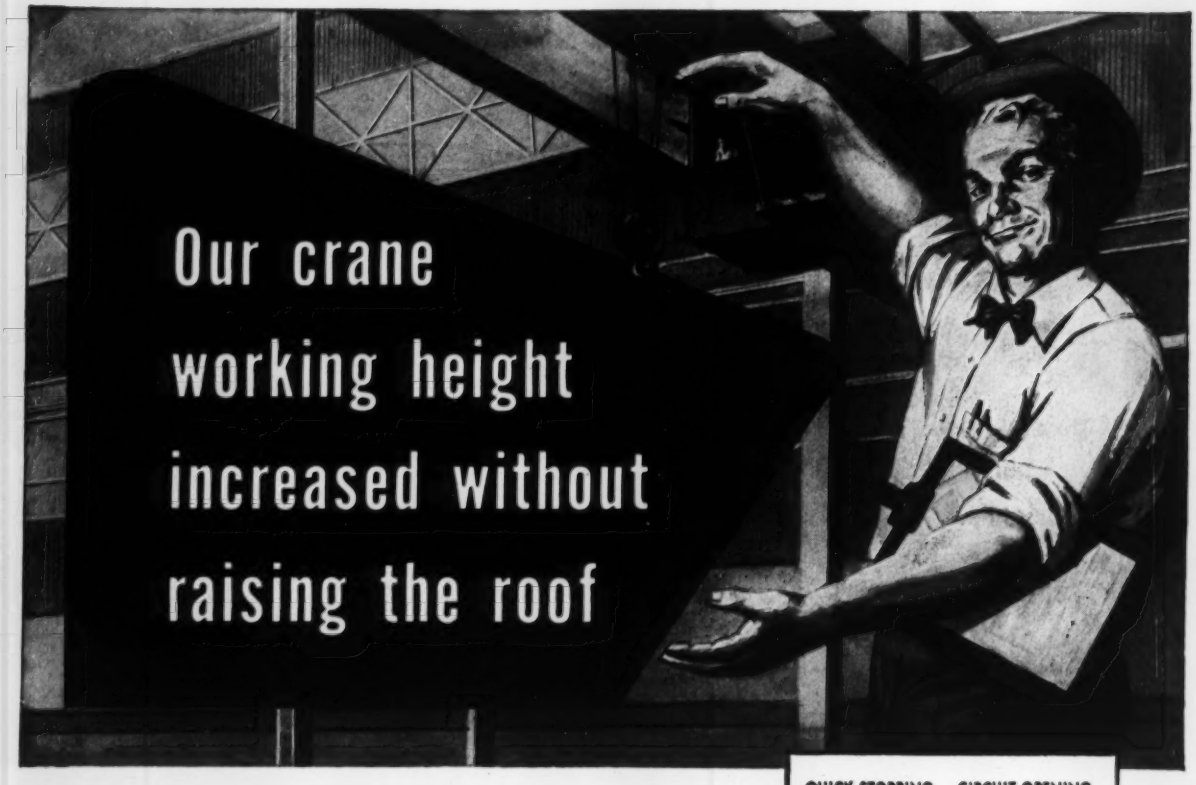
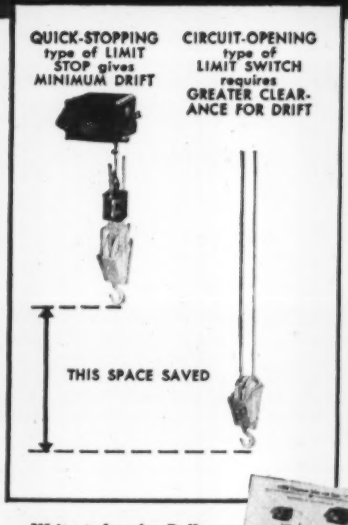


WITH EC&M YOUNGSTOWN SAFETY LIMIT STOPS

"We frequently needed more headroom on our D-c cranes. The limit stop setting couldn't be raised without sacrificing the clearance needed by the hoist-brake to safely stop the fast-moving empty hook, which hoists 2½ to 3 times faster than when hoisting full load. We had a choice . . . we could raise the roof . . . which meant deeper footings, heavier building columns and increased costs for lighting, heating and ventilating . . . OR . . . we could equip our cranes with **quick-stopping** EC&M Youngstown Safety Limit Stops."

Yes, Youngstown Hoist Limit Stops not only disconnect power from the motor but also apply **dynamic braking** to aid the hoist-brake in a **quick stop** . . . giving less drift . . . more headroom. **Safe,** too, because the tripping point does not change . . . is not affected by stretching of the hoist cables. The point at which the rising crane-hook makes contact to lift the Youngstown suspended-weight always remains the same.

For increased D-c crane headroom, **plus safety,** investigate EC&M Youngstown Safety Limit Stops.


QUICK-STOPPING type of LIMIT STOP gives MINIMUM DRIFT
CIRCUIT-OPENING type of LIMIT SWITCH requires GREATER CLEARANCE FOR DRIFT
THIS SPACE SAVED

Write today for Bulletin 1032 which describes and illustrates EC&M Youngstown Limit Stops.

2775

YOU CAN LIFT LOADS HIGHER AND SAFER WITH EC&M YOUNGSTOWN SAFETY LIMIT STOPS

THE ELECTRIC CONTROLLER & MFG. CO.

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Technical Outlook

CO_2 SHIELDING— At least three different companies are working on carbon dioxide as a likely candidate to replace argon and helium in inert gas-shielded welding. Liquid Carbonic Corp. in Chicago eliminates all but a small stream of argon immediately surrounding the electrode. Rest of the gas volume is CO_2. Total gas costs are reduced 70 per cent, and weld quality is excellent. Company will soon market an inexpensive conversion kit that will adapt two popular brands of torches to this double-gas operation.

EMBRITTLEMENT NIPPED—If you're pickling titanium in the conventional 10 per cent nitric-2 per cent hydrofluoric acid bath, you're inviting hydrogen embrittlement. Up the nitric content to 20 per cent and keep it there, Rem-Cru urges. Below 20 per cent nitric acid content, embrittlement curve rises sharply.

SILICON CARBIDE CERMET— Search for a new high-temperature material resulting from bonding silicon carbide with a metal or alloy indicates that iron and a mixture of chromium and molbdenum are promising candidates. The experimental cermets are being formed by hot pressing.

FATIGUE LOOKS GOOD— Metallurgists at Battelle report molybdenum may not be adversely affected by notches. Notched and unnotched specimens (arc and powder metallurgy types) were given rotating-bending fatigue tests at room temperature.

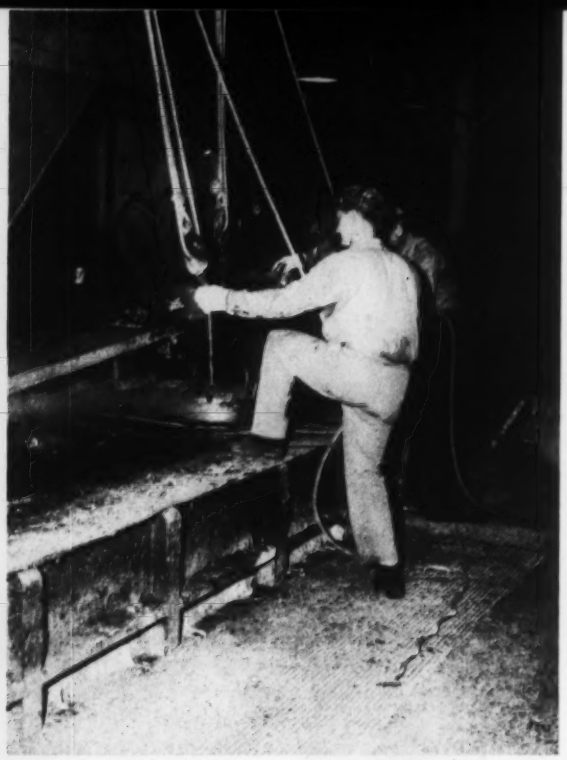
DEEP FREEZE STEEL— Stainless steel, deep frozen for ductility and impact strength at low temperatures, is on the market. To be marketed as Allegheny Metal 350, the steel results from a research project to find a metal for airframe construction which can be easily formed and then hardened at temperatures low enough to prevent excessive scaling and distortion. Chromium, nickel and molybdenum are combined with a low-carbon steel base. After forming, the metal is chilled to from 80 to 100 degrees below zero.

SCRATCHABILITY— Orange peel, eggshell finish and waviness don't affect accuracy of measurements on a new abrasion tester developed by the Porcelain Enamel Institute. It will check abrasion resistance of paints, plastics and fibrous materials as well as porcelain enamel.

LOAD LIMIT UP— Bigger truck payloads that meet load limit laws are a big argument for aluminum dump bodies. Body weight savings of around 50 per cent are possible. Another dividend: Aluminum tail gates are easily handled by one man and aren't so likely to smash fingers.

STRETCHING STANDARDS— When thermocouples for measuring jet temperatures above 2800° F came into use recently, means had to be devised to calibrate them. GE does it with a laboratory furnace heated with a 6-in. irridium coil which requires only about 500 watts to turn out jet heat.

DRY X-RAY—Look to xeroradiography for some surprises. It's a method of taking x-ray photographs on metal plates vacuum coated with selenium. Exposure to radiation causes an electrostatic charge impressed on the selenium surface to migrate through to the base plate. The plate is devolped by dusting with a fine powder which clings where a charge remains on the selenium surface. Pictures have three dimensional quality, frequently show more than conventional x-rays. Commercial units are not available, but Haloid Corp. is busy ironing out the bugs.



Galvanizer's dilemma: Will this batch be embrittled?

Bend Around Galvanizing Embrittlement

Hot dip galvanizers can breathe easier. Cold work is the culprit behind galvanizing embrittlement in cold worked steels, results of a recent study indicate

By R. W. SANDELIN
Chief Metallurgist
Connors Steel Division, H. K. Porter Co.
Birmingham, Ala.

EMBRITTLEMENT is a dirty word among hot dip galvanizers.

If it happens, it's usually to cold-worked materials that have been hot dip galvanized later. Typical user of such materials is the pole line hardware industry.

Small wonder then that a pole line hardware maker (Line Material Co., Southern Plant Division of McGraw Electric Co.) joined with a steel producer (Connors Steel Division, H. K. Porter Co. Inc., Birmingham, Ala.) to do something about embrittlement. Results were reported by the author in a paper presented at the spring meeting of the American Hot Dip Galvanizers Association.

Results—Out of the effort came these conclusions:

1. Severe cold work is the big culprit in embrittlement after galvanizing. For safety, cold bending radii should be no smaller than three times the section thickness.
2. Steel damaged by galvanizing embrittlement must be annealed at temperatures in the 1200 to 1500° F range.
3. Hydrogen is only a minor factor in galvanizing embrittlement.
4. Aluminum-killed steels are least susceptible to galvanizing embrittlement of steels commonly used in pole line hardware.
5. If designs require sharp bends: A. Fabricate hot. B. Anneal following cold working. C. Or use aluminum-killed or other non-aging steels.

Fifty Steels—Fifty different commercial steels were studied, including rimmed, semikilled, silicon-killed, aluminum-killed and aluminum-silicon killed types. All are used as galvanized structural members.

At the outset, it was necessary to accept the fact that hot dip galvanizing does embrittle some cold-worked steels. But suspicion was that the fault lay more in poor design or the wrong steel than in the galvanizing. Pointing sharply at this conclusion was the location of all fractures at sharp bends.

Bend Test—Galvanizing embrittlement is a form of strain aging. It happens when steel is heated for a short time at 850° F (galvanizing temperature) after being cold worked.

Embrittlement Test Procedure

Treatment	Purpose
1. Cold work by subjecting steel to a 90 degree bend, transverse to the direction of rolling, using bend radii of ⅛, ¼, ½, ¾ and 1 in. Test.	To establish embrittling effect of cold work only.
2. Cold work, pickle in 10 per cent sulphuric acid at 180° F for 10 minutes. Test.	To establish effect of hydrogen embrittlement only.
3. Cold work, pickle, heat in furnace at 400 or 600° F for 4 hours. Test.	To establish effectiveness of eliminating embrittlement by a low temperature anneal.
4. Cold work, heat in furnace at 850° F for 15 minutes. Test.	To establish effect of the galvanizing temperature only without actual submersion in zinc.
5. Cold work, galvanize in molten zinc at 850° F for 3 minutes. Test.	To establish any difference between galvanizing heat only and actual submersion in molten zinc at the same temperature.
6. Cold work, pickle, heat in furnace at 850° F for 15 minutes. Test.	To establish combined effect of hydrogen embrittlement and galvanizing temperature only; also to determine effectiveness of galvanizing heat in eliminating hydrogen embrittlement.
7. Cold work, pickle, galvanize in molten zinc at 850° F for 3 minutes. Test.	To establish possible difference in the actual galvanizing operation and the effect of galvanizing temperature only in eliminating embrittlement.

Bend Test: Flatten the 90 degree bend under compression in a hydraulic press until the sample reveals the beginning of an open crack or until the metal fails by an audible snapping sound. Results expressed as:

(A) Ductility—the amount of bendback from the original 90 degree bend before fracturing or cracking, measured in degrees.

(B) Quality Index—the bendback value of the treated sample divided by the bendback value for the original untreated sample (1), expressed in per cent.

Since bending is the most common form of cold working, a simple bend test was used. All steels studied were either basic open hearth or basic electric—Bessemer steels are of little importance in pole line hardware.

Steels were cold worked by bending the test specimen 90 degrees with ⅛, ¼, ½, ¾ and 1-in. bending radii. In later tests it was found that radii of ⅛, ¼ and ¾ in. were sufficient for evaluation. Each steel was given test treatments No. 1, 2, 3, 5 and 7 described above.

Thickness — Selection thickness proved to be of considerable importance because cold work becomes greater for a given bending radius as the section gets thicker. For this reason, maximum bending radius possible should be used. Steels which are seriously embrittled in heavy sections can be safely used in lighter sections for a given bending radius.

Steels subject to severe galvanizing embrittlement for ⅛ and ¼-in. radius bends exhibited little or no embrittlement for the ¾-in. bends. This was true in every instance for normal analysis steels, 0.10 to 0.25 per cent carbon. For such steels (ordinarily cold-fabricated and galvanized in the pole line hardware and similar industries) the ¾-in. radius bend would provide safety for section thicknesses up to and including ⅜ in. For ½-in. sections minimum radius for a cold bend should be 1¼ in.

Right Radius—The tests demonstrated that a bending radius three times the thickness will ordinarily insure a satisfactory galvanized product for steels with 0.10 to 0.25 per cent carbon and otherwise normal composition. For softer steels, satisfactory galvanized properties can be obtained with smaller bending radii, but since the exact analysis is not always known to the fabricator, he should use as large a bending radius as design will permit.

Sharp bends should never be permitted on heavy section material unless it is bent hot or the material is later annealed or normalized before galvanizing. While not recommended, there are instances where a bending radius of ⅛ in. or ¼ in. might be satisfactory for thin sections, such as ⅛ in. or $\frac{3}{16}$ in. However, for heavier sections, such as ⅜ in. and ½ in., the steel (even aluminum-killed steel) would be severely damaged by galvanizing.

Hydrogen—Embrittlement from hydrogen absorption as a result of pickling was observed for all steels. Aluminum-killed steels seemed to be least affected. Maximum effect happened with the ⅛-in. radius bend, which produced maximum cold work. Other factors contributing to increased hydrogen absorption were increased section thickness and high carbon and/or phosphorus content.

Treatment No. 3 revealed that the 600° F anneal, which was supposed to eliminate hydrogen and

Pole line fixture about to be hot dip galvanized. Adequate radius bending rules out embrittlement

Typical Galvanizing Embrittlement Test Results

TEST SPECIMENS 2 x 5/16 IN.

Steel	Bend Radius	Ductility	Quality Index	Fracture Load	Embrittlement
Silicon-killed, fine grain, basic open hearth	⅛	13	52.0	6680	Severe
C Mn P S Si	¼	37	56.9	6170	Severe
.24 .96 .024 .051 .271	¾	90	100.0	6550	None
Rimmed, basic open hearth	⅛	12	41.3	4480	Severe
C Mn P S Si	1¼	90	100.0	4540	None
.09 .37 .010 .040 .002	¾	90	100.0	4550	None
Semikilled basic open hearth	⅛	16	59.2	5260	Severe
C Mn P S Si	¼	45	68.1	5030	Noticeable
¼ .36 .027 .046 .023	¾	90	100.0	5200	None
Silicon-killed, coarse grain, basic open hearth	⅛	7	43.7	6410	Severe
C Mn P S Si	¼	36	46.1	6920	Severe
.25 .48 .022 .038 .282	¾	90	100.0	5970	None
Aluminum-killed, basic open hearth	⅛	90	100.0	4520	None
C Mn P S Si Al	¼	90	100.0	5610	None
.09 .42 .012 .042 .006 .031	¾	90	100.0	5600	None

restore ductility, was too high. Aging took place which, in practically all cases, further embrittled the steel. This is of practical significance since temperatures as high as 600° F have been recommended for elimination of hydrogen embrittlement.

Anneal No Help—Such temperatures are undoubtedly satisfactory for straight, hot-rolled steel bars that have not been cold worked. However, for steels cold worked, pickled and not subsequently galvanized, temperatures over 400° F should never be used. In steels to be galvanized there is little use trying to eliminate hydrogen at the lower temperatures since most of it will be eliminated at the 850° F galvanizing temperature.

The question arose as to whether embrittlement could be eliminated by heat from a second dip or regalvanizing. A series of tests was made. Regalvanizing resulted in no benefit. It also appeared that the method of cooling, quench or air-cool, has no bearing on ductility of the bend.

How Steels Rank — Aluminum-killed steels proved superior to other types they were compared with. Semikilled steels appeared slightly superior to fully silicon-killed steels, other items being equal. Difference between the semikilled and silicon-killed steels was slight. Fine grain silicon steels were consistently slightly superior to coarse grain silicon-killed steels, the former having aluminum added for grain control.

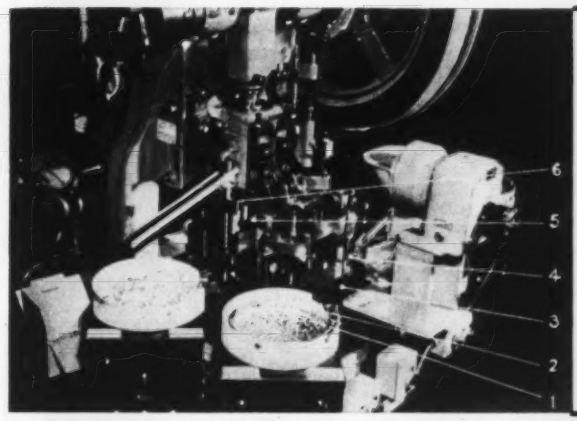
Rimmed steels, being of the open type with little or no deoxidation, are susceptible to strain aging and galvanizing embrittlement. For lighter sections and less severe bends, the tendency to become embrittled was less than for semi-killed and silicon-killed types. Probably the dense low-carbon rim imparts maximum ductility to the outer surface where maximum stresses occur.

The study demonstrated that steels vary considerably in susceptibility to galvanizing embrittlement, with aluminum-killed steels proving least susceptible. Basic open hearth or basic electric steel should be specified with carbon and phosphorus contents as low as practicable. "Off analysis" grades should never be purchased since such steels tend to exhibit erratic work-hardening. Steels should not exceed 0.25 per cent carbon where severe cold-forming operations precede galvanizing.

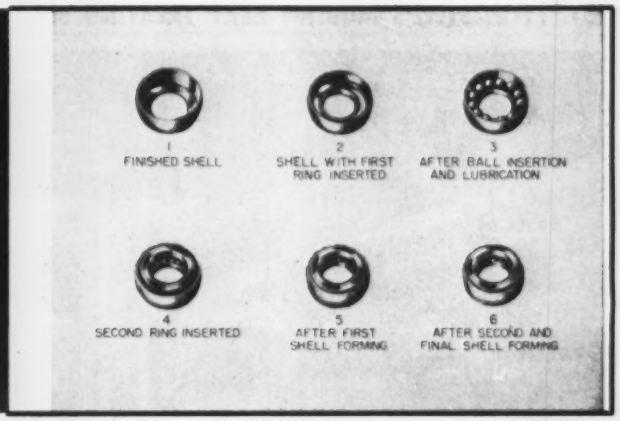
Sharp Bends—If design specifications require sharp bends on heavy material, the following courses of action are recommended: 1. Specify the use of aluminum-killed or other non-aging types of steel. 2. Galvanize two or three of the fabricated items following regular procedures. Then test for embrittlement by simple unbending tests at the bends or other severely cold-worked areas. If no galvanizing embrittlement is revealed, proceed with the lot, but spot check occasionally.

Restoring Ductility—If embrittlement happens, three courses are open to restore ductility:

1. Fabricate hot after the steel has been heated to the proper forging temperature. 2. Anneal or normalize after cold working. Temperatures as low as 1200° F may be used but higher temperatures are recommended. 3. Anneal cold-worked areas with a welding torch by heating to at least a cherry red color and allowing to air cool.



Here is the automatic setup New Departure uses to turn out low-cost ball bearings, showing the cycle parts follow as they're indexed through six assembly stages



Bearings in process of assembly are shown above after each of the six stages has been completed. The machine also completes the job by counting and packaging

Bearing Assembly Goes Automatic

When New Departure came to grips with a problem of low-cost bearing production, they found the big price tag was assembly, not fabrication. Here's their solution

PRODUCTION and marketing of ball bearings require intensive study of every cost item. This is particularly true of bearings having less than the highest accuracy requirements. Production cost and ultimate price must be held to a fraction of that of high-precision types.

An example is a small, low-cost ball thrust bearing made by GM's New Departure Division, Bristol, Conn. It's used in slow-speed applications such as door hinges. The bearing has a 0.280-in. bore, OD of 17/32 in. and is 0.228 in. in width. Its static load rating is 500 lb, with a 100-lb rating at 500 rpm.

Economies of Assembly—Although the bearing required a high production rate, the main problem wasn't in fabricating parts but in assembling them economically. In ordinary assembly of similar small parts, the human element can effect quality and production rate. Handling cost also becomes significant.

Instead of whittling away at each phase of the problem, New Departure tried a different approach. They're using a special multiple-station press to make bearing assembly entirely automatic. They report uniformity, quality and high production are achieved without scrap or rejections. And labor cost is a fraction of the total product price tag.

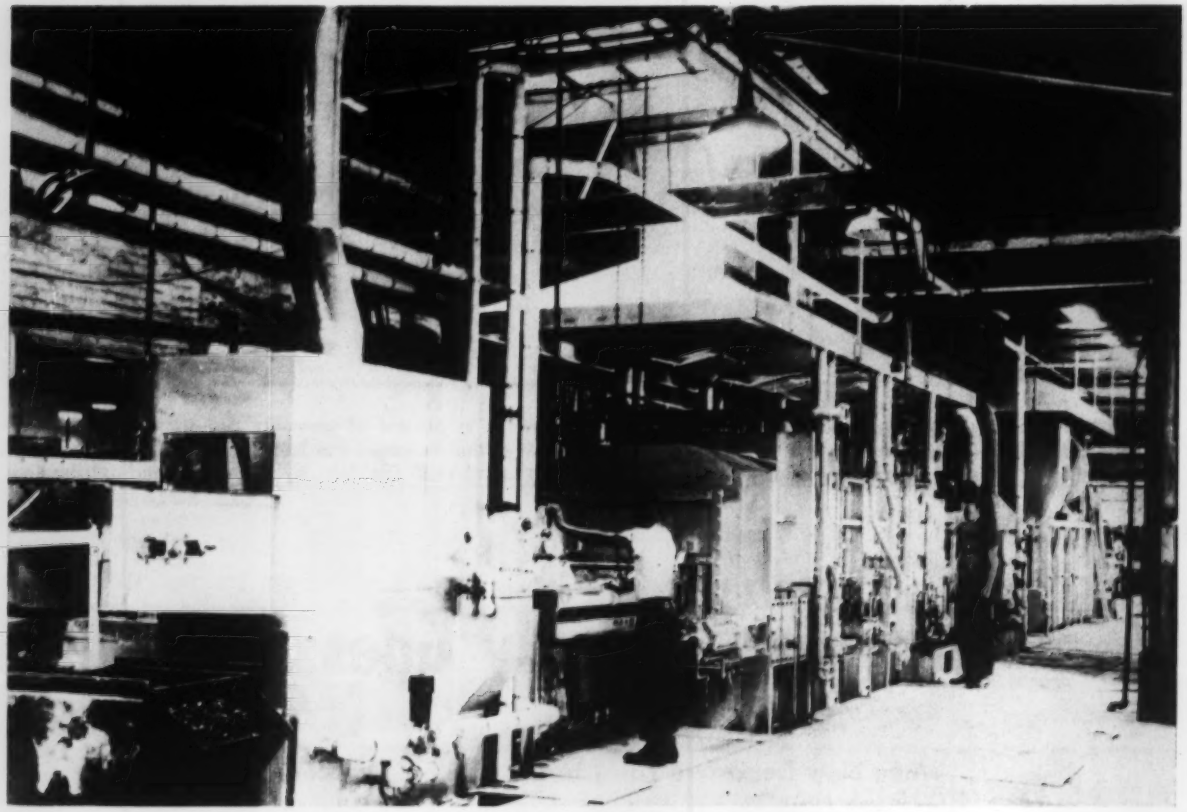
Six Stations—Present cycling produces 52 completed bearings a minute. Parts are fed from vibrating magazines, with fixtures that orient the parts automatically into correct assembly position.

Through its series of six stations, the machine performs these operations: 1. The shell is introduced, open side up. 2. First race ring is placed, ball race up in the shell. 3. A complement of balls is inserted and spray lubricated. 4. Second ring is positioned, ball race down on the balls. 5. Shell is given a first forming around rings and balls. 6. Shell is finish-formed for size and running clearance with upper ring.

Control of Rejects—When a part is presented to its station incorrectly, is offsize or has been damaged previously, a control stops the machine. Of course, this not only makes for uniformity but prevents tool damage and loss of production time.

One result is to practically eliminate operator time. With the machine doing its own inspecting and rejecting during assembly, handling cost is kept low with need for human final inspection reduced.

Finally, completed bearings are counted automatically and deposited into containers for shipping.



Modern integrated controlled atmosphere line for clean hardening and tempering 50,000 diversified fasteners an hour. The hardening furnace is radiant tube fired and uses an RX generator atmosphere at 1560° F. The draw furnace operates at temperatures up to 1100° F. Belt conveyors are used in and between the furnaces

Controlled Atmosphere Heat Treating Part I

The right gas environment can be tailored to your heat treating needs. Parts come out clean and uniform. Automatic processing is practical

By HENRY M. HEYN
Surface Combustion Corp.
Toledo, O.

Other articles in STEEL's Modern Heat Treating Series have covered several types of atmospheres operations. This one by Mr. Heyn gives an over-all picture.

MOST COMPANIES aren't realizing the full potential of controlled atmosphere heat treating.

The process fits modern production concepts. It gives uniform materials; it is controllable by instrumentation; and it is easily integrated into in-line operations.

Its effective use can reduce costs, improve product quality, eliminate manual labor and avoid waste disposal problems.

Down to Cases—Prepared atmospheres have other advantages: Scaling is eliminated. This allows work to be held to close dimensional tolerances.

Since there is no scale, problems of cleaning internal surfaces and inaccessible areas are avoided.

Cleaning costs go up fast with increasing complexity of shape and internal cavities.

In processes such as hardening and annealing, abrasive blasting or pickling is not needed. This cuts down handling costs. There are no disposal problems with pickle solutions.

Prepared atmospheres will add, maintain or remove carbon. The chemical composition and properties of a metal surface can be tailored to exactly what's needed. In some cases, atmospheres are used to change the composition of steel through its entire cross section.

Start Here—Certain fundamental reactions are the basis for generation and utilization of prepared atmospheres. They follow established laws of physical chemistry and thermodynamics.

Three gas-metal reactions take place between iron and oxygen. They are irreversible.

$$2\,Fe + O_2 \rightarrow 2FeO$$
$$4\,Fe + 3O_2 \rightarrow 2Fe_2O_3$$
$$3\,Fe + 2O_2 \rightarrow Fe_3O_4$$

While these reactions affect the metal being treated, they are not applicable for control of the processing operation.

For Control—The two gas-metal reactions below are reversible controlled reactions between iron and combined oxygen. They are of basic importance in controlled atmosphere heat treating.

$$Fe + H_2O \rightleftarrows FeO + H_2$$
$$Fe + CO_2 \rightleftarrows FeO + CO$$

Water-gas Reaction—In heat treatment of iron or steel, another important reaction comes into consideration—the well known water-gas reaction:

$$CO + H_2O \rightleftarrows CO_2 + H_2$$

On the basis of this reaction, ratios of metallurgical important constituents in a furnace atmosphere are defined by the equation:

$$K = \frac{(CO_2) \cdot (H_2)}{(CO) \cdot (H_2O)}$$

K is a constant, depending on the temperature of the reaction. Effect of temperature on the reaction is given in Figure 1.

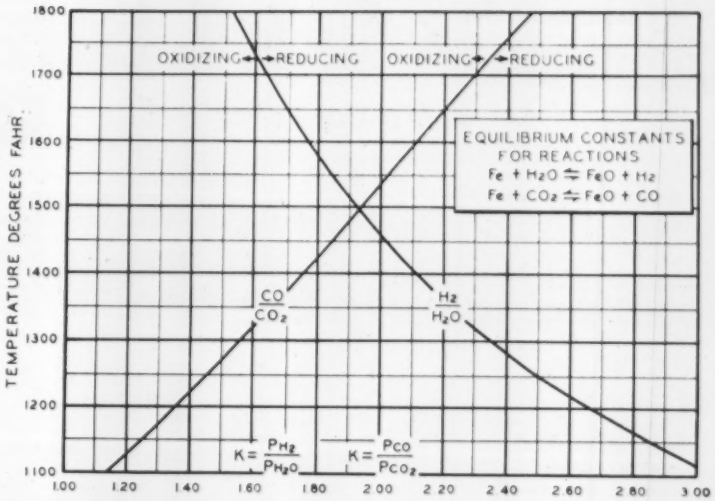


Fig. 1—CO:CO_2 and H_2:H_2O equilibrium constants for oxidizing-reducing reactions with iron or steel

Carb-Decarb Reactions — While many metals, such as chromium, tungsten and vanadium, react chemically with carbon, the essential reactions in controlled athosphere heat treating of steel are the following: (This involves no reference to the presence of alloying elements.)

$$3\,Fe + 2CO \rightleftarrows Fe_3C + CO_2$$
$$3\,Fe + CH_4 \rightleftarrows Fe_3C + 2H_2$$
$$3\,Fe + CO + H_2 \rightleftarrows Fe_3C + H_2O$$

Equilibria for these reactions at 1700 F, are shown in Figure 2. These are key reactions in prepared atmosphere heat treating.

Furnaces—Equipment for controlled atmosphere operations consists of a furnace, atmosphere generator and means for atmosphere testing and controls.

A suitable furnace involves:

1. Isolation of work being heat treated from products of combustion.
2. Isolation of work being heat treated from the external atmosphere; this means a tight furnace.
3. Vestibules, curtains and pressure differentials for excluding outside air from the furnace at the entrance (and exit, in the case of a continuous furnace).
4. Facilities for controlling the atmosphere before quenching or during slow cooling. This is especially important if bright work is required and there is to be no subsequent cleaning.

Generators—Generators for prepared atmospheres fall into two basic categories: Exothermic and endothermic. Surface Combustion's RX, AX and HX gas generators are examples of the endothermic type; DX, NX and HNX gas gen-

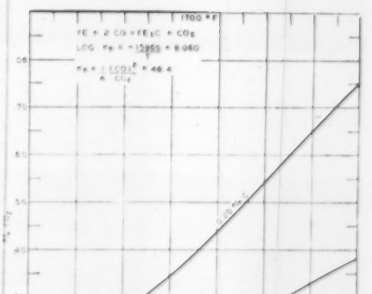


Fig. 2—CO_2 annd CO percentages in equilibrium with various carbon concentrations at 1700° F (Groves)

How To Use Prepared Gas Atmospheres for Heat Treatment of Ferrous and Nonferrous Metals

TYPE GAS — Constituents—per cent by volume	METAL TO BE TREATED — Copper	Low carbon steel up to 0.20 C	Medium carbon steel 0.20-0.60 C	High carbon steel above 0.60 C	Special steels	COST per thousand cu ft*
1. RX generator gas CO_2 0.0% · CO 20.7 · H_2 38.7 · CH_4 0.8 · H_2O 0.0 · N_2 39.8		Carburizing, Dry cyaniding, Homogeneous carburizing, Brazing, Sintering	Carburizing, Bright annealing, Clean hardening, Carbon restoration (skin recovery), Dry cyaniding, Brazing	Bright annealing, Clean hardening	Clean hardening of tungsten, molybdenum, and cobalt high speed steels	$0.23
2. DX generator gas (lean), 40F dew point CO_2 10.5% · CO 1.5 · H_2 1.2 · CH_4 0.0 · H_2O 0.8 · N_2 86.0	Bright annealing, sintering					$0.07
3. DX generator gas (rich), 40F dew point CO_2 5.0% · CO 10.5 · H_2 12.5 · CH_4 0.5 · H_2O 0.8 · N_2 70.7		Bright annealing, Brazing	Up to 30 min. exposure Bright annealing			$0.09
4. NX generator gas CO_2 0.05% · CO 1.5 · H_2 1.2 · CH_4 0.0 · H_2O 0.0 · N_2 97.25	Bright annealing,	Bright annealing,	Bright annealing, Clean hardening	Bright annealing, Clean hardening		$0.10
5. HNX generator gas CO_2 0.05% · CO 0.05 · H_2 3.0 to 10.0 · CH_4 0.0 · H_2O 0.0 · Balance	Extra bright annealing	Extra-bright annealing			Clean annealing of stainless and silicon steel	$0.12
6. AX generator gas (dissociated ammonia) CO_2 0.0% · CO 0.0 · H_2 75.0 · CH_4 0.0 · H_2O 0.0 · N_2 25.0		Rapid deoxidation of surface metal, Brazing, Sintering			Bright annealing of stainless and silicon steel	$1.25
7. HX generator gas CO_2 0.5% to 2.0 · CO 0.5 to 1.0 · H_2 50.0 to 99.8 · CH_4 0.0 to 0.4 · H_2O 0.0 to 3.5 · Balance		Rapid deoxidation of surface metal			Bright annealing of stainless and silicon steel	$0.35

* These approximate costs are based on natural gas at $0.40 per thousand cu ft, electricity at $0.01 per kwh, ammonia at $0.05 per lb and water at $0.06 per thousand gallons. Amortization is not included.

Note: RX, DX, NX, HNX, AX and HX are trademarks of Surface Combustion Corp. used here for convenience.

erators are exothermic. Composition of the atmospheres produced by these generators, cost and applications are given above.

Inert — Exothermic generators liberate heat. Main use is to make protective atmospheres. They operate by combustion of a fuel gas-air mixture to produce an atmosphere high in nitrogen.

With proper purification it is inert to steel under most conditions and can be used to preserve the status quo of the metal.

Reactive — Endothemic generators operate by catalytic cracking of mixtures of hydrocarbons with air and/or steam and are used to produce atmospheres high in CO and H_2. These are reactive.

They can be used to add, maintain, or remove carbon and thus change the chemical composition of the metal surface. In some cases, endothermic atmosphere is used to change the chemical composition of steel through its entire cross section.

Control—Instrumentation is essential for controlling and recording the dewpoint of the atmosphere, together with Orsat analysis, in gas carburizing. Other instruments are used to measure and record combustible gases and oxygen in the furnace atmosphere.

Bright Hardening—Both RX endothermic and DX exothermic atmospheres are used in clean or bright hardening. Type of atmosphere depends upon final specifications for the surface quality of the work. Work is handled in continuous or batch furnaces.

If the steel surface must be completely free of scale and decarburization, particularly in the medium and higher carbon ranges, RX generator atmosphere is best. DX atmosphere is practicable for hardening medium carbon steels where slight surface decarburization is tolerable.

Controlled atmosphere heat treating fills the bill for clean hardening parts, such as tools and dies, where the preservation of a clean surface is essential to the quality of the finished product.

The concluding part of this article will appear in next week's issue of STEEL. It will discuss gas carburizing, homogeneous carburizing, carbon restoration, malleablizing and dry cyaniding.

a CMP cost cutting report

ON THIS DRAWN METAL PART...

CMP COLD ROLLED STRIP STEEL

(NON-SCALLOPING QUALITY)

eliminated earing and an extra operation .... stepped up production

BEFORE

Buying a standard specification cold rolled strip steel this manufacturer had several fabrication problems. Needing a precision assembly fit with other components, they frequently had runs of many rejects and production slow-downs. Inspection costs for in-process fabricating was excessive. Each unit, after drawing, also required an additional trimming operation to remove the ears. Because of the uniformity needed, costs were running out-of-line and the added manual work to reclaim rejects was further increasing costs.

AFTER

First, a suggestion from a CMP representative gained interest and established several meetings with production and engineering to consider the CMP proposal. Several test runs were made with the non-earring CMP specification steel developed specifically for this job. It worked wonders. the trimming operation was eliminated completely and a precision quality for uniformity was established. A close, dependable assembly of components was made possible, eliminating the "re-work" line entirely. Rejects were reduced to an absolute minimum. Perhaps you could improve your product and production, too, with CMP "specific specs" cold rolled strip steel — we will be glad to work with you.

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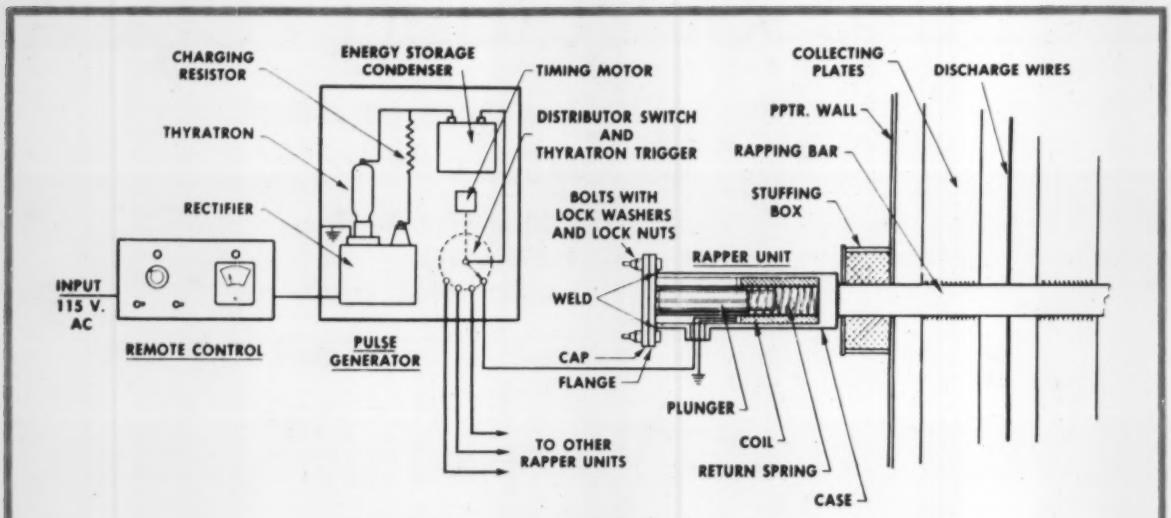
4425 W. Kinzie, Chicago
Phone : COlumbus 1-2700

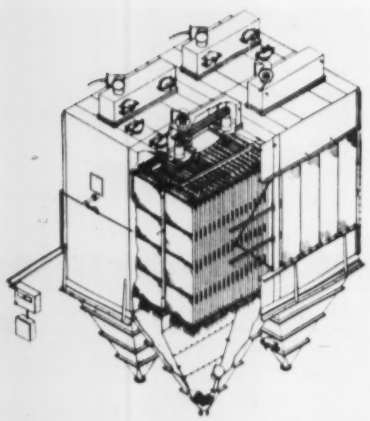


Schematic view of a magnetic impulse rapper

Survey of Smoke Control PART I

Precipitators have long been employed for arresting dust particles in blast furnace gases. Now they've tackled a lot of new jobs for the industry's smog control studies

By ROGER A. RENWANZ
and
SCHAEFFER E. SPECHT
Engineers
Research Corp.
Boundbrook, N. J.



Schematic view of a horizontal precipitator which is most commonly used in the steel industry

AMERICA's iron and steel plants have been getting steadily cleaner the last decade. Electrostatic precipitators supplied by one company alone added nearly 17,000,000 cfm to gas cleaning capacity—more than one-third of them were installed in the last several years.

The steel industry is second only to the power industry in the total cfm of gas cleaned with Cottrell precipitators built by the Research Corp., Bound Brook, N. J. Steel is leading in the rate of new installations. Hot scarfing machines, open-hearth and electric furnaces, sintering machines and iron cupolas are recent recruits in the precipitator fold.

The pattern of gas cleaning capacity (cfm) expansion is shown in the accompanying table.

Application Increases—Over 148 blast furnace Cottrell precipitators are in operation. This is the most widespread application. Their gas cleaning capacity is about 8,327,130 cfm, or over 4¼ trillion cu ft per year.

New uses for precipitators also are expected to grow to the importance reached by blast furnace precipitators. For example, in addition to the first installation of three Cottrell precipitators for sintering machines at the Tennessee Coal & Iron Division, U. S.

How complete is "complete"?

Motch & Merryweather builds circular sawing machines which cut off stock up to 43" diameter, ferrous or non-ferrous (titanium to magnesium) –rounds, squares, or structural shapes.

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From 1/4" all the way up through 43" dia.

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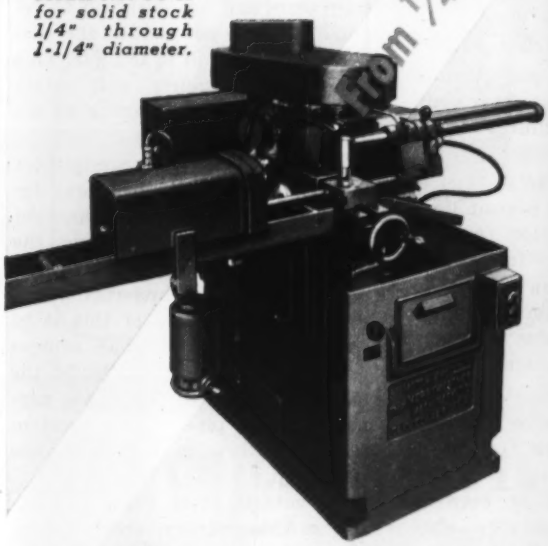

Using the Triple-Chip method, Motch & Merryweather circular sawing machines cut off stock faster and more economically than does any other method. We offer you not only a complete line of machines, but complete service after the sale. Only Motch & Merryweather builds all three—the Triple-Chip saw blade, the circular sawing machine which uses it, and automatic blade sharpeners to sharpen and re-sharpen at low cost.

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Steel Corp. in Alabama, two more are under construction for sintering machines at the Columbia-Geneva Steel Division, U. S. Steel Corp., Geneva, Utah.

The three Tennessee Coal & Iron precipitators will clean 450,000 cfm of gas, and the Columbia-Geneva units, 280,000 cfm. In another recent application, Columbia-Geneva is installing eight precipitators to clean gases from ten open-hearth furnaces at its Geneva, Utah steelworks. The first installation of precipitators for this application was made at the Torrance, Calif. Works of Columbia-Geneva, where four units went into operation at the end of 1951.

Handles Electric's Fumes—Another new application is the precipitator designed to clean gases from two 18-ton capacity electric furnaces in a large midwestern mill. It will clean 46,000 cfm of gas at 200° F at 95 per cent efficiency.

Two precipitators have been installed at U. S. Steel's Morrisville, Pa., plant to clean gases from hot scarfing machines. One precipitator will be used in the slabbing mill and the other in the blooming mill. The precipitator in the slabbing mill is designed to clean 20,000 cfm and that in the blooming mill 75,000 cfm of gas at 90°F with a rated 95 per cent efficiency.

Another new use of precipitator gas cleaning equipment is found at the Duquesne Works of the United States Steel Corp., where five electrostatic precipitators are installed for cleaning gas from ferromanganese blast furnaces. These precipitators are equipped with the new MI (magnetic impulse) rapping system to prevent smoke from escaping to the atmosphere during precipitator cleaning. Previously, collector plates were intermittently freed of acaccumulated material mechanically or pneumatically. Large batches of precipitated material dropped into the hopper, producing "puffs," which were emitted from the stack.

The problem has been readily solved by the new magnetic impulse rapper. It delivers continuous or controlled sequential shocks. Collecting electrodes are cleaned at a uniform rate, preventing major disturbances in the hopper caused by large batches of precipitated dust.

PART I

COTTRELL PRECIPITATORS

Growth of precipitator capacity, 1934-1953, in cfm

Industry	1934-1938	1939-1943	1944-1948	1949-1953
Power	6,225,600	15,339,000	12,933,000	39,532,500
Steel	1,189,090	3,156,902	1,886,526	4,464,100
Nonferrous	281,200	589,800	452,330	2,012,900

Operating Principles—A high difference of potential is maintained and a current flow is set up between two spaced sets of electrodes through which the gas is passed. One set of electrodes, known as discharge electrodes, usually is filamentary, while the other set, known as collecting electrodes, is composed of steel plates with large surfaces. High voltage impressed across the electrodes ionizes the gases and produces a corona effect at the discharge electrodes. Ions formed attach themselves to suspended particles in the field, and charged particles are attracted to the electrode of opposite electrical sign. Particles then give up their charge and are removed (by rapping or vibration) to hoppers underneath the electrodes.

Several types of precipitators are in operation, but the main types used for metallurgical applications are the plate and the pipe precipitators. The plate type is made up of a shell containing a series of parallel plates (collecting electrodes). They form ducts through which the gas passes. In the center of these ducts a series of discharge electrodes are suspended from an insulated framework.

The pipe precipitator consists of a number of pipes (collecting electrodes) nestled in a header plate within a shell or between headers with a discharge electrode suspended axially from an insulated framework in the center of each pipe. In both types the high voltage current is conducted from the electrical equipment to the discharge electrode. The collecting electrodes are grounded through the shell, completing the circuit through the ground to the electrical equipment.

Why Gases Are Detarred—Precipitators are routine in several jobs such as detarring coke oven gas, cleaning oven fuel gas and secondary cleaning of blast furnace gas. Detarring coke oven gas is one of the oldest applications. Its purpose is to remove the tar and oil from these gases, to prevent contamination of end products and to eliminate operating difficulties, particularly plugging of burner ports. The Cottrell unit used here is generally the pipe type with collecting electrodes 6 or 8 in. in diameter. They usually are located after the exhauster and before the ammonia saturators and are designed to remove 95 to 99 per cent of the suspended tar and oil in the gas. This application is fairly well established as standard practice in the steel industry.

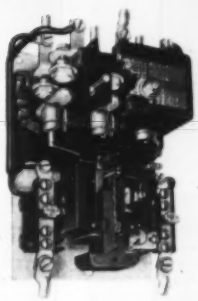
In addition to the precipitator in the by-product plant, many installations incorporate another pipe precipitator to remove the last traces of tars and oil from the gas used for underfiring the ovens. The purpose of this is to prevent plugging of small orifices or burner ports. The collected tar and oil flow down the inside surfaces of the pipes to the bottom and then through a seal to the tar sump.

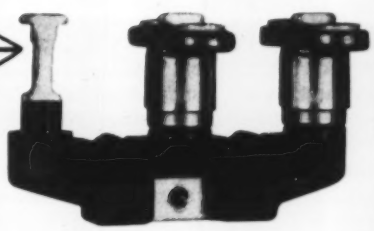
In normal blast furnace practice in this country, about 5 tons of gas is generated for every ton of iron tapped, and for every ton

(*Please turn to p.* 116)

Keeps Controls Clicking!

CHICAGO STEEL SERVICE Helps Customer Find the Right Stainless for Trouble-free Performance





THE PROBLEM—This manufacturer of electrical motor controls required a material for the movable contact supports in their solenoid starters to withstand the constant on-and-off impacts of normal usage. The specifications called for material with high strength, rigidity and fatigue resistance. Furthermore, it had to stand up under the heat and pressure encountered in molding the support into the bakelite crossbar.

THE SOLUTION—CSS metallurgists, working with the sales engineer servicing this account, made exhaustive tests on various types of stainless steel. It was found that specially-tempered Type 302 stainless steel met every requirement. As a result, no problems have developed with this vital part of the control.

•

Perhaps you have a question concerning the type of stainless steel best-suited to your product. Remember, stainless is not only corrosion-resistant, but it also offers many physical and mechanical advantages not found in other metals.

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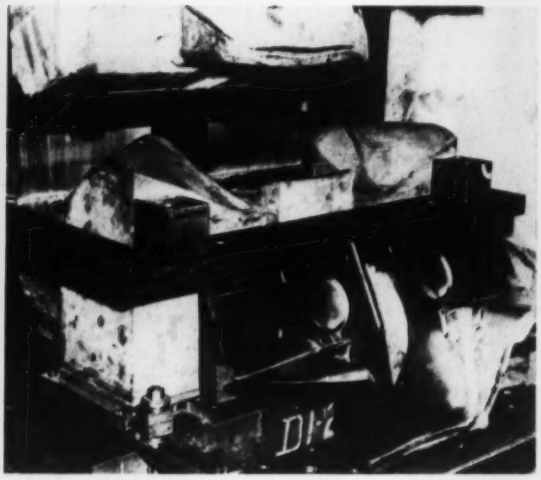
Operator at the Maquoketa plant of Clinton Machine Co. removes a stamped outboard motor upper housing from a resin draw die



Experimental restrike die in open position. A steel part stamped from it lies in front of the die platen

Versatile Plastic Bids for More

Tools of plastic continue to outdistance their presumed limitations. An epoxy resin is being used successfully in dies, jigs, patterns and fixtures

THREE WEEKS AFTER blueprints were delivered to the diemaker, Clinton Machine Co., Maquoketa, Iowa, was drawing 0.050-in. aluminum outboard motor parts with the completed dies.

It used to take the company 15 weeks to get delivery on drawing dies, and they used to cost three times as much. Why the big difference? The dies were plastic.

Resin the Reason — Kish Plastics Products Inc., Lansing, Mich., made the dies of Epon, a Shell Chemical Corp. epoxy resin. The four dies ordered (three drawing and one restrike) have turned out over 15,000 aluminum panels without a sign of deterioration.

Punch and hold-downs were poured in a mold cast directly from a model of the part. Negligible shrinkage of the plastic (0.0001 to 0.0004 in. from mold dimensions) made it possible to cast a die that required a minimum of hand barbering.

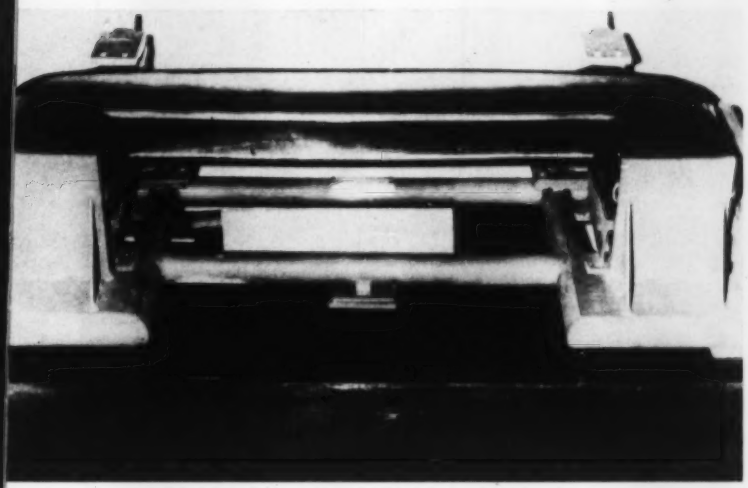
Case and Core — Two different plastic formulations were used. One with a high metallic filler ratio was used for the core of the draw punch and constitutes the bulk of the tool. The other, with a high resin content, surfaces the punch to a depth of ¼ in. Using the same resin base for both eliminated dimensional changes due to core shrinkage.

The same resin in both cast and glass laminate condition is being used successfully in drop hammer dies, form tools, vacuum molds, routing and drilling fixtures, welding and checking fixtures and foundry patterns. Superior compressive strength, improved dimensional stability and excellent chemical resistance and adhesion are qualities claimed for the resin.

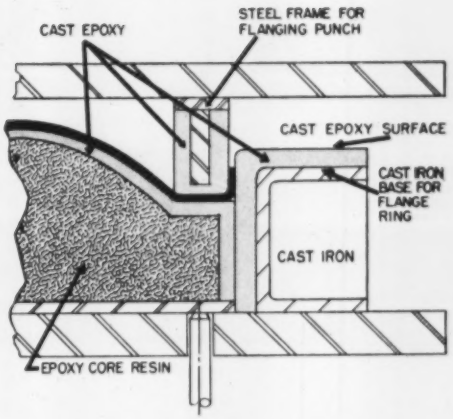
Sharing With Steel—The new resin is also being used for components of a high-production steel die assembly. The resin substitutes for steel in hold-down pads, stripper plates, knock-outs and locating units. Here the resin parts work as well as steel parts and reduce original and maintenance costs. The company looks for wide use of this type tooling by the automotive industry.

A manufacturer of domestic air conditioners has been using epoxy dies and components to produce formed and drawn steel parts. Reduced tooling costs make it economically practical for him to change models oftener.

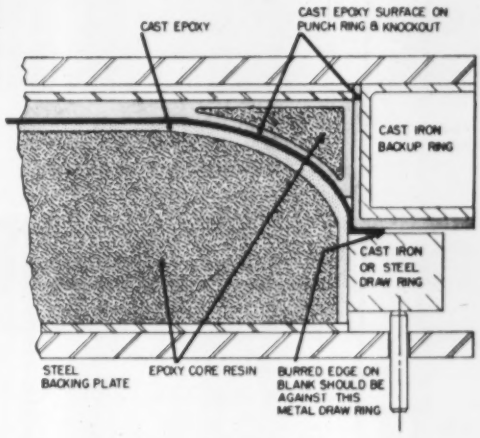
Manufacturing Technique — To



Automobile bumper being checked in resin-faced fixture. Fixtures can be readily repaired or brought back to size by casting on more resin



Typical draw die using epoxy resins


CAST EPOXY
CAST EPOXY SURFACE ON PUNCH RING & KNOCKOUT
CAST IRON BACKUP RING
CAST IRON OR STEEL DRAW RING
STEEL BACKING PLATE
EPOXY CORE RESIN
BURRED EDGE ON BLANK SHOULD BE AGAINST THIS METAL DRAW RING

Typical flanging die using epoxy resins

Tooling Jobs

By DALE KNEPP
Kish Plastics Products Inc.
Lansing, Mich.

make a plastic punch for the same company, the former steel punch was used as a model. A mold was made by covering the punch with resin-impregnated glass cloth layers backed by plaster of Paris.

This female mold was then lined with ¼ in. of caulking material and resin poured into the lined cavity. After setting up for eight hours and oven curing at 180°F for another eight, this became the punch core.

The caulking was then stripped from the mold, a parting agent applied to the mold face and the newly cured core suspended in the mold cavity. Into the space between it and the mold, a modified epoxy resin was then poured to form the punch shell. A three-hour cure for the shell and a steel base plate for the core completed the punch.

The draw plug was produced in a similar manner. Plastic punch and draw plug were then combined with steel components to make a complete die.

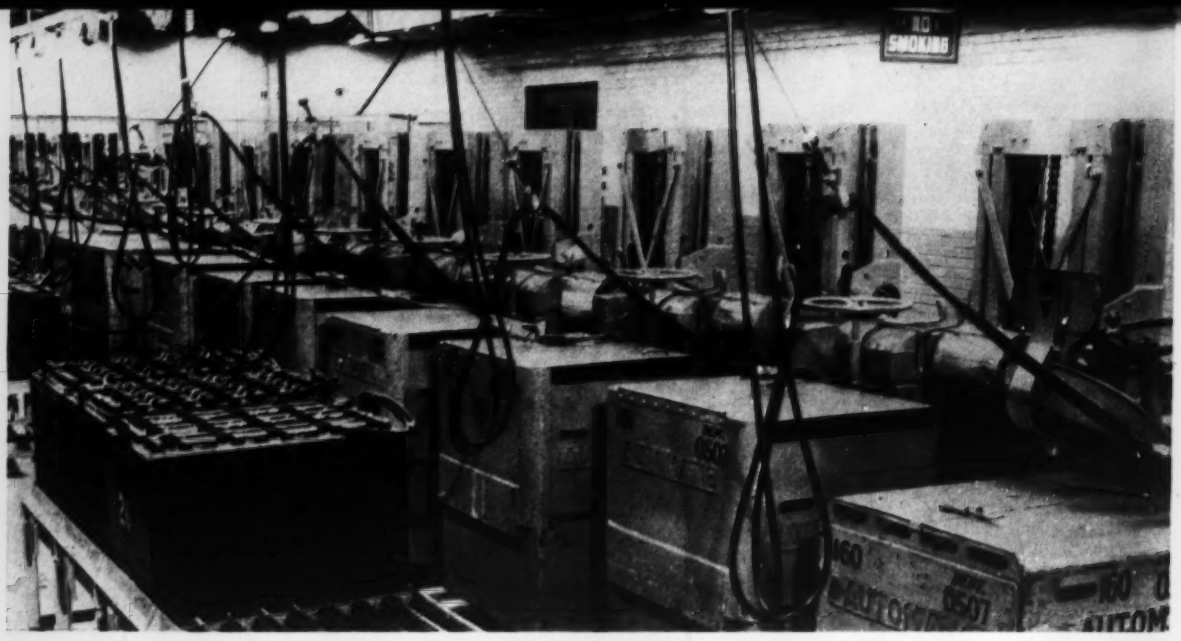
Versatility—Steel die lubricants or drawing compounds may be used with these tools. Press speeds are similar to speeds for steel dies. Dies are easily repaired and can be repaired repeatedly if necessary. Main limitation is weight of stock that can be drawn: 16-gage steel is the recommended maximum.

A number of foundries are using patterns made from epoxy resins. They report that release of sand is satisfactory, and, in other respects, performance compares favorably with metal patterns. Pattern repair or resurfacing can be completed in a hurry.

Drill fixtures of glass cloth reinforced by the resin and employing as many as 2500 drill bushings have replaced metal fixtures in several large aviation plants. By using a transfer method, these plants have eliminated jig boring and expensive hole locating equipment.

Developmental Work — Auto plants are using epoxy dies extensively for developing and proving die design. After a part is proved, the plastic die may be used as a master for Kellering a steel production line die. The plastic die becomes a stand-by die in case the steel die needs repair.

Plastics are also proving useful as parts of checking fixtures that earlier were made of wood or metal. One big advantage is that they are easily modified or duplicated.



End-of-shift lineup for mass truck battery servicing operation

Put Battery Maintenance on the Line

This company reduced waste of manpower and battery life by developing a system that gets the job done simply and on a schedule that keeps batteries in service

IF YOU'RE operating battery-powered trucks, you've probably been impressed with the value of good charging and maintenance practice. It's a project that inspires almost everyone to dream up his own system.

Inefficiency can absorb a big chunk of profit. A fair rule of thumb for gaging your setup is to view it in the light of three approaches: Battery life, personnel time and total maintenance cost.

Keep It Simple—A good way to make all three factors profitable is to keep changing and charging simple. An example can be taken from a large automotive supplier, where they've devised the multiple overhead charging system above.

Its effect is evident by comparison with some old practices. Nineteen Automatic electric trucks are in service. To keep them that way required an average of about two men per shift. Of course, proper equipment and planning could rid the job of this excess manpower—in fact, one man per shift now handles the entire operation.

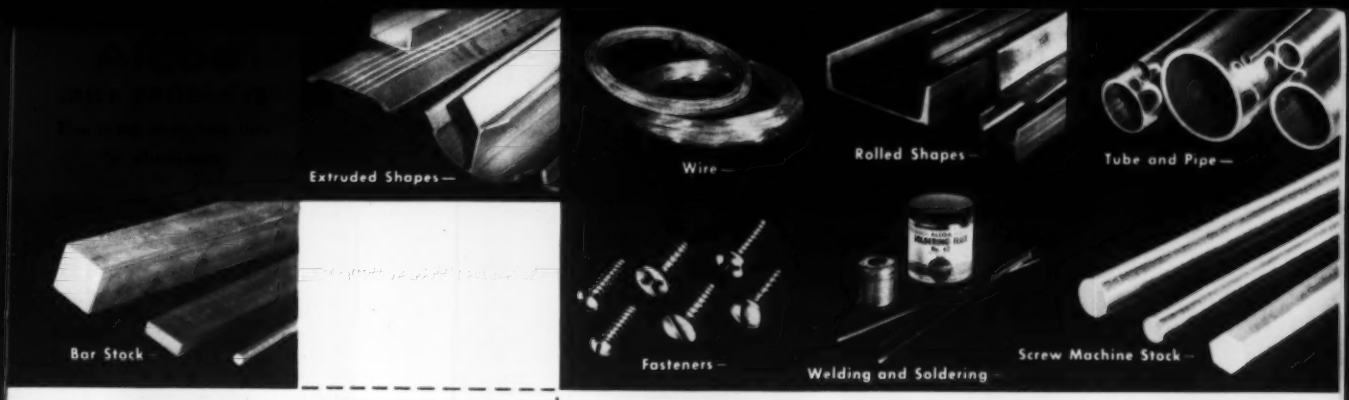
And Direct—One of the things that built up the need for men was absence of facilities for battery cleaning and repair. To get this portion of the job done, they trucked the 1638-lb batteries to a repair firm.

Doing away with this circuitous arrangement not only relieved the manpower problem, it added life to batteries by putting maintenance on a regular schedule. Need to haul the batteries out of the plant for service naturally led to a failure to do the job at the proper time. The company estimates that washing batteries on time adds three years to the life of each unit. On a $1500 power investment, this alone is significant.

It Works Like This—To set up the system, they marked off a parking area for each truck and ran a power duct overhead. Short cables in spring return reels connect with the batteries. The reels do away with the usual maze of lines and damage to lines when trucks back over them.

After each shift, truck operators pull into the parking lanes and the single attendant simply snaps the charging cables into each battery. Roller dollies with hydraulic lifts take care of transferring batteries from truck to conveyor when an exchange is necessary. Chain or wire rope slings that could short across the cells are unnecessary.

Naturally, charged spares are on hand when heavy work loads force quick changes. Otherwise, the batteries stay in the trucks until time for cleaning and repair.



Announcing I.G.* Electrode, Alcoa's New Filler Metal for No-Flux, Consumable Electrode Welding

Soundness of joints made by consumable electrode welding depends to a great extent on electrode quality. By using Alcoa's new I.G. Electrode, you can have sound, quality welds every time. Now released after months of laboratory testing, this electrode is made under rigid quality control. Samples from every production lot are test welded, and the weld specimens are X-rayed for soundness. No electrode is shipped that doesn't in every way meet Alcoa's standards.

Each spool is carefully packaged and labeled according to alloy and wire size. Cleaned and ready for use, I.G. Electrode is offered in sizes from .030 inch to ⅛ inch, in three alloys, 1100 (2S), 4043 (43S) and 5154 (A54S). Ten pounds are level wound on an expendable spool in one continuous length.

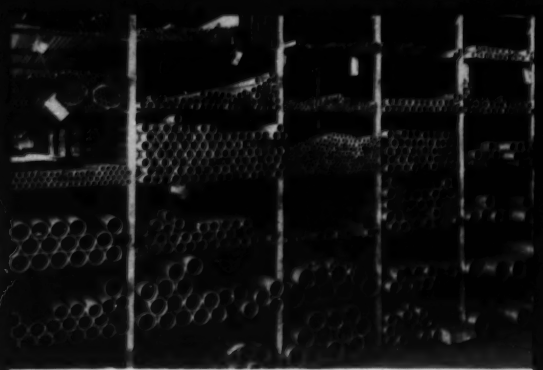
Alcoa's I.G. Electrode for consumable electrode welding is just one more addition to Alcoa's already complete line of aluminum welding, soldering and brazing wires and fluxes. All these materials are available to you from ample stock maintained by your local Alcoa distributor. For further information about aluminum welding, call your local Alcoa sales office. Expert welding guidance and counsel, drawing on Alcoa's 66 years' experience, are available for your assistance. Look under "Aluminum" in the classified section of your telephone directory.

*I.G.—Inert Gas

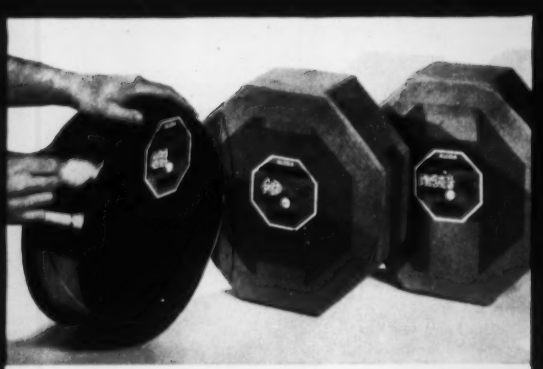
Welding, Brazing and Soldering Supplies

Products of Sixty-Six Years of Pioneering in Aluminum

EXTRUDED SHAPES: For thresholds; window sills; door frames; glass stops; copings; gravel stops; trim; truck bodies. Also angles; channels; tees; zees; etc., for structures.

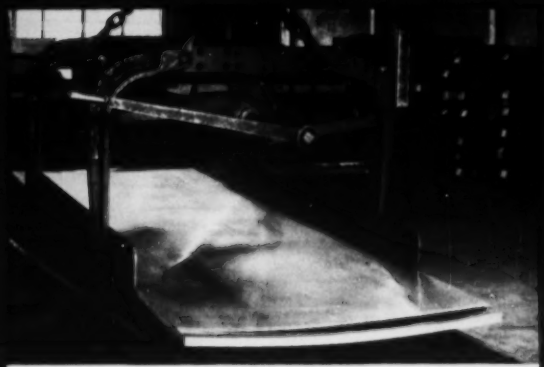


TUBE AND PIPE: Coiled tube; Alcoa® Utilitube; straight tube in round, square and rectangular shapes; heat exchanger tubes; standard pipe and pipe fittings; construction pipe; rigid conduit.



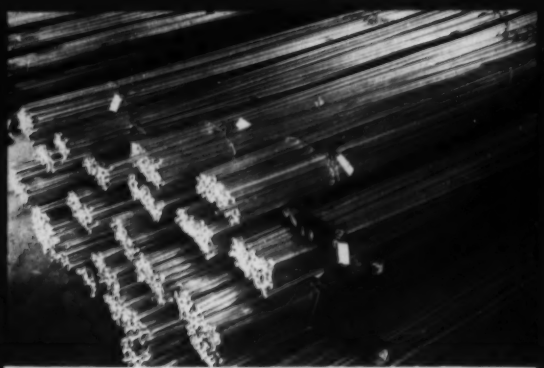
I.G. WELDING ELECTRODE: Available in three alloys and in six diameters. It is level wound on expendable spools in continuous lengths.

ROLLED SHAPES: Equal angles; unequal angles; channels; I-beams; tees; zees. Suited to a variety of structural applications.

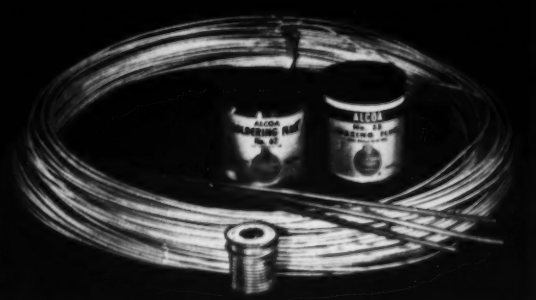


SHEET AND PLATE: Flat and coiled sheet; circles; patterned sheet; plate; tread plate; roofing and siding sheet; roofing accessories and fasteners; specialty sheet.

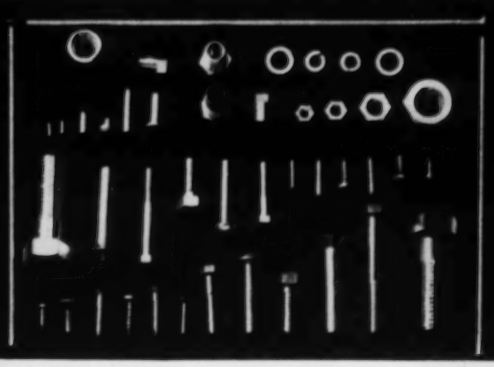
BAR STOCK: Square, hexagonal and rectangular in all commercial alloys. Rolled and cold finished to final dimensions for superior tolerance and finish.



SCREW MACHINE STOCK: Available in 2011-T3 (formerly 11S-T3), the free-machining alloy, and 2017-T4 (formerly 17S-T4), a higher strength alloy, plus 2024, 6061 and 7075 (formerly 24S, 61S and 75S).



WELDING AND SOLDERING: Welding and brazing wire; welding and brazing flux; solder flux; solder.



FASTENERS: Machine screws, wood screws; washers; nuts; bolts; rivets. Recommended for fastening aluminum to prevent electrolytic damage.

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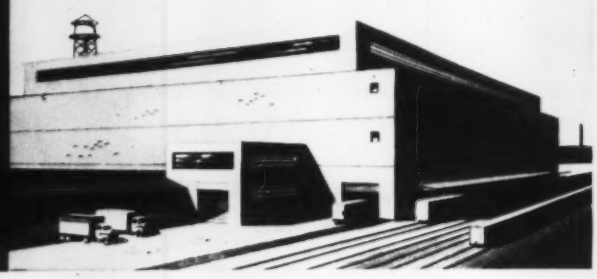

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ALCOA ALUMINUM

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Electric Blanket for Sand

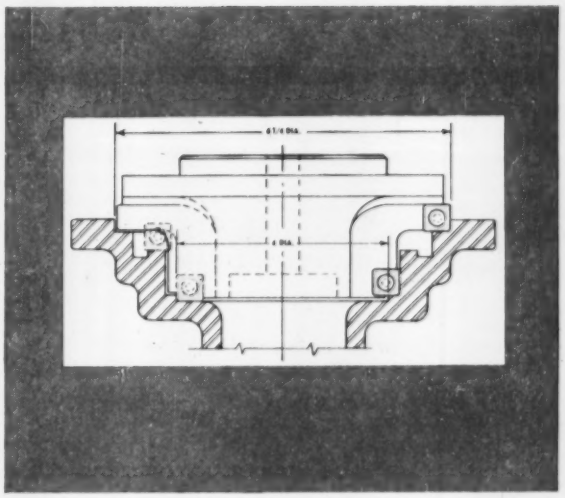
WHEN COLD WEATHER hits the foundry, molding sand freezes. It has to be heated to be workable.

But this winter there will be no smoky salamander stoves at Lackawanna Foundry Co., Lackawanna, N. Y. Electric heating cable laid over the sand will keep it workable through cold nights.

Each bench molder has one set of Thermwire cable, 80 ft long and rated at 400 watts to drape on his sand pile. Initial and operating costs are said to be low.

Thermwire is made by Edwin L. Wiegand Co., Pittsburgh.

Buttons Make Boring Time

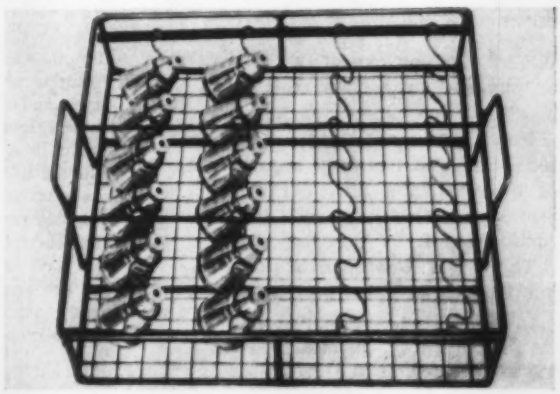


THE JOB at an Eastern ordnance plant was going too slowly. A boring, counterboring and facing operation on malleable cast iron transfer cases was being done on a radial drill press—at 0.022-in. feed, 375 sfm, with cuts to ¼ in. in depth. Original tool was a boring head with brazed-on tungsten cutters.

Cutters required regrinding after 175 pieces. That took 20 hours. Brazing and grinding new tips wasted 34 hours.

But changeover to Kendex carbide buttons on the boring head has eliminated all regrind and associated down time. When 175 pieces have been run, the square inserts are simply rotated ¼ turn. After 700 pieces they are thrown away. Kendex inserts are a Kennametal Inc. product.

Basket Does Double Duty



DUAL PURPOSE is a fine idea when it works. Take the two-in-one basket Bulova Watch Co. is using.

It serves equally well for a work transfer receptacle and degreasing basket for aluminum bomb fuse heads. The basket is steel, but replaceable wire fuse holders are aluminum. Cutting out handling steps in degreasing goes a long way toward preventing injury to the parts.

Wiretex Mfg. Co., Fairfield, Conn., made the baskets.

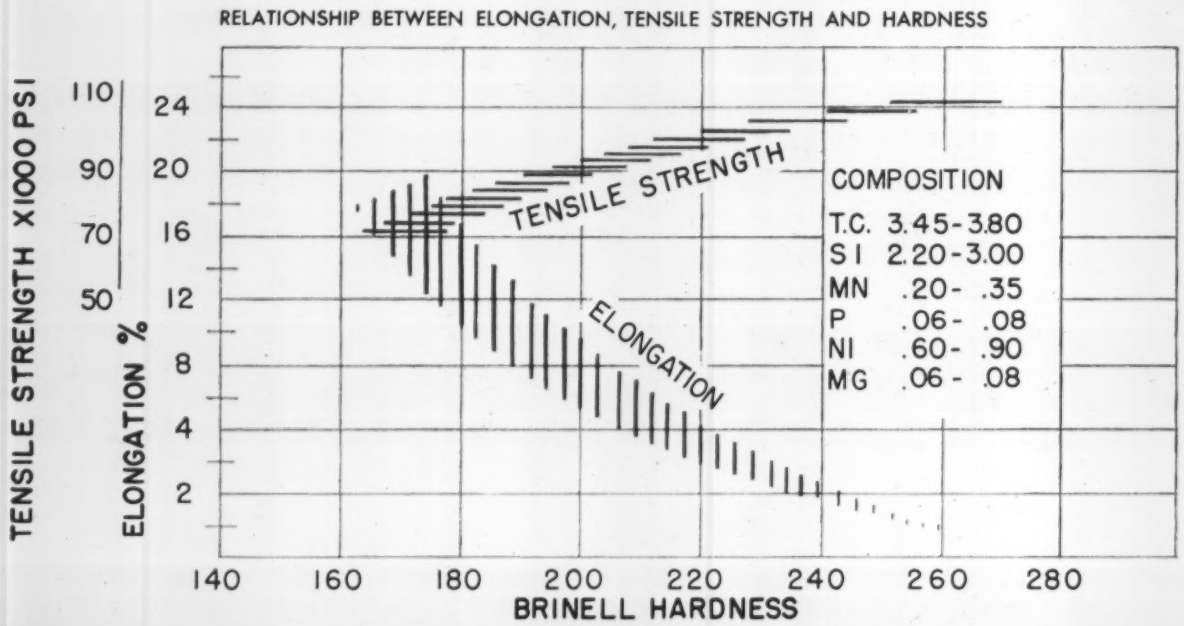


Fig. 4—This chart shows relationship for ductile cast iron in 1-in. sections, in the as-cast condition.

What Physicals Can You

Knowledge of physical properties is complicated because each casting presents its own problem. Part 2 provides a rundown of the significant elements

WHAT can you expect in the way of physical properties from castings?

You'll find mass is the key factor. Since this is true regardless of material, it's difficult to present properties expected in the casting itself.

The *Steel Castings Handbook* has this to say about mass:

1. There is a decrease in strength and ductility, as measured at the center of the section, as the mass increases.
2. There is a decrease in density and carbon content as the mass increases.
3. There is a slight decrease in notched bar impact strength as mass increases.
4. The character of the microstructure, the carbon segregation and lowered density values are responsible for the decrease of mechanical properties as mass increases.

Each casting has its own problem. The best way to get information is to cut up several castings, but it's a hard and expensive job.

Hardenability — In steel castings, hardenability has an important effect on physical properties. Its most profound effect is on those that are liquid quenched and tempered. It has less effect on the annealed or normalized and tempered castings. Because higher physical properties are obtained by liquid quenching, you

Expect?

By T. E. EAGAN
Chief Research Metallurgist
Cooper-Bessemer Corp.
Mt. Vernon, O.

must take hardenability into account when physical properties of the test bar are concerned.

The complexity of hardenability requires expert interpretation usually available in steel foundries. So it's a good idea to keep in close contact with the foundry when the higher physical properties are required.

Correlation of Tensiles—No set rule can be given for correlation of tensile properties in the test bar and the steel castings. But experience can give an approximation, at least for the annealed, normalized and drawn heat treatments. Tensile strength and yield point usually do not drop much more than about 10 per cent. Elongation can be considerably under that obtained in the test bars. No prediction can justly be made on elongation and reduction of area; these two items depend on such things as solidity of the material, direction of testing and location of the test bar in the casting.

It's not always practical to predict the tensile properties of S.G. iron castings as-cast. Gagnebin, in his "Industrial Status of Ductile Iron," presents a relationship (Fig. 4) for the tensile strength and elongation with brinell hardness for this condition. This relationship is accurate for relatively thin-walled castings that will have the same cooling rate as the 1-in. keel block.

In heavier sectioned castings we disagree with the accuracy of this relationship. In most cases they show no elongation. Your best bet is to contact the foundry if physical properties in the as-cast state are important.

Annealed State—In the case of grade 60-40-10 of Specification A339, representing castings in the annealed state, good correlation can be shown. Using 1-in. keel block results, and those taken from castings of different section thicknesses, the correlation shown in Table 3 was obtained.

Generally, there's a wider spread between expected tensile strength and yield point results in the casting than in the test bar. Elongation is definitely lower in the casting.

Brinell Hardness—Caution must be taken in using brinell hardness as a criterion for tensile properties of S.G. iron. Charts like Fig. 4 would be satisfactory in all cases where material is completely or almost completely nodular graphite in structure. It will work almost always on simple shaped castings with section sizes under 1 in. If the casting is large and complicated, the test bar could be completely nodular and the casting almost completely gray iron.

In this case, low brinell hardnesses do not indicate only low tensile strength with no elongation. It's necessary to adopt a 3-in. Y block to correlate the test bar to the casting as far as nodularity is concerned. In more than 500 such tests, we seldom have found over 2 per cent elongation in the as-cast condition but have obtained elongations between 15 and 27 per cent on tests taken from these same bars when annealed.

So you can get the same brinell hardness in gray iron as in S.G. iron. In steel castings, brinell hardnes does indicate tensile strength according to the well-known tables.

Malleable Correlation—Correlation of test bar with castings in the case of malleable iron is simplified because the physical properties are obtained by heat treating or annealing white iron. For the A197 and A47 specs, you can assume that tensile and yield strengths of the casting would be about the same as the test bar. Elongation could be the same or somewhat lower, depending on solidity of the section from which it's taken.

Pearlitic Malleable—In the case of pearlitic malleable iron, speci-

Table 3
Correlation of Tensile Strength in 1-in. Keel Block and Castings of S.G. Iron
ANNEALED

	1-In. Keel Block	Casting
Tensile Strength, psi	66,000-76,000	60,000-80,000
Yield Point, psi	47,000-57,000	48,200-64,000
Elongation	10.3-19.4%	5.3-14.9%

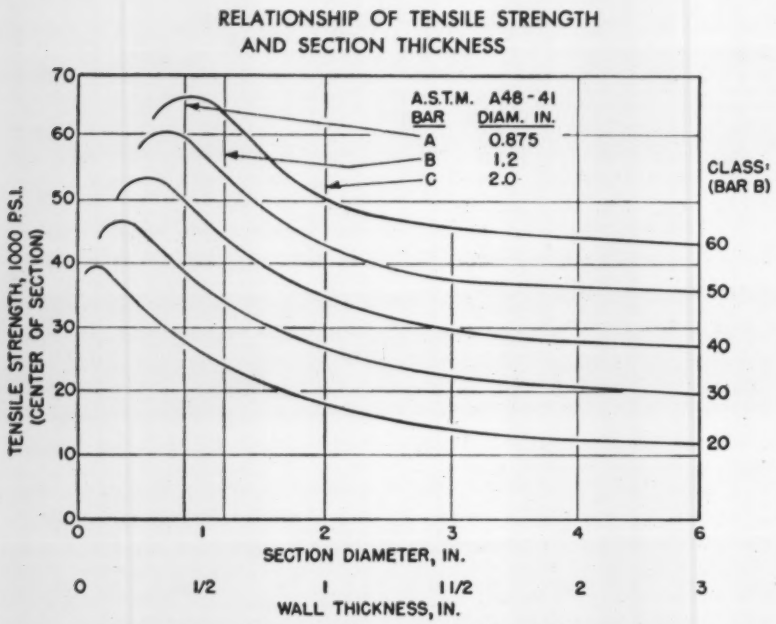


Chart shows relationship for various classes of gray iron

fication A220, correlation between the properties in the casting probably can be judged by brinell hardness. The *Malleable Iron Handbook* gives approximations.

In the case of gray iron, the problem of correlating tensile properties of test bar and casting becomes difficult. Gray iron, of course, is section sensitive. A correct balance between cooling rate, chemical analysis and melting procedure is essential to produce good specification.

Gray Iron Tensiles—For thin walls, tensile strength is less than a slightly heavier thickness because the matrix microstructure has some primary cementite in it. After reaching a peak, tensile strengths of all curves drop relatively fast, then flatten out. Flattening helps in predicting tensile properties of gray iron castings. You can set up a formula to predict gray iron tensiles with reasonable accuracy. An example: Our Grove City, Pa., foundry took test bars from critical casting sections and correlated results with tensile properties in the 1.2-in.-diameter test bar and the carbon equivalent.

We established a correlation of tensile strength in the test bar and casting. The equation: Tensile strength in casting = 1210 + 0.766 × tensile strength in 1.2 in. test bar. The spread obtained with this equation is too wide. But if we correlate tensile strength in the casting with carbon equivalent, we obtain the equation: T.S./10,000 = 19.8 − 4.37 C.E.

To re-emphasize: Although this method applies to only one foundry, a similar set can be made for any foundry.

Yield Point — Minimum yield point for each of the ferrous materials under discussion is shown in Fig. 3 (STEEL, Nov. 15, p. 162). In cast steel, the yield point varies with tensile strength. For the highest tensile strength, the yield point is 83 per cent of the tensile strength; for the lowest tensile strength, it is 50 per cent. In S.G. iron, in the as-cast state, this yield point is 75 per cent of tensile strength; in the annealed state it is 67 per cent. Malleable iron is usually controlled by its yield point.

In the regular malleable ASTM A47, yield point is 64 per cent of the tensile strength for grade 32510 and 66 per cent for the 25010 grade. For pearlitic malleable, yield point is 71.5 per cent for grade 43010, 68.5 per cent for 48005, 75 per cent for 60003 and 78 per cent for grade 70002. The gray iron yield point is so close to the tensile strength its percentage is never obtained.

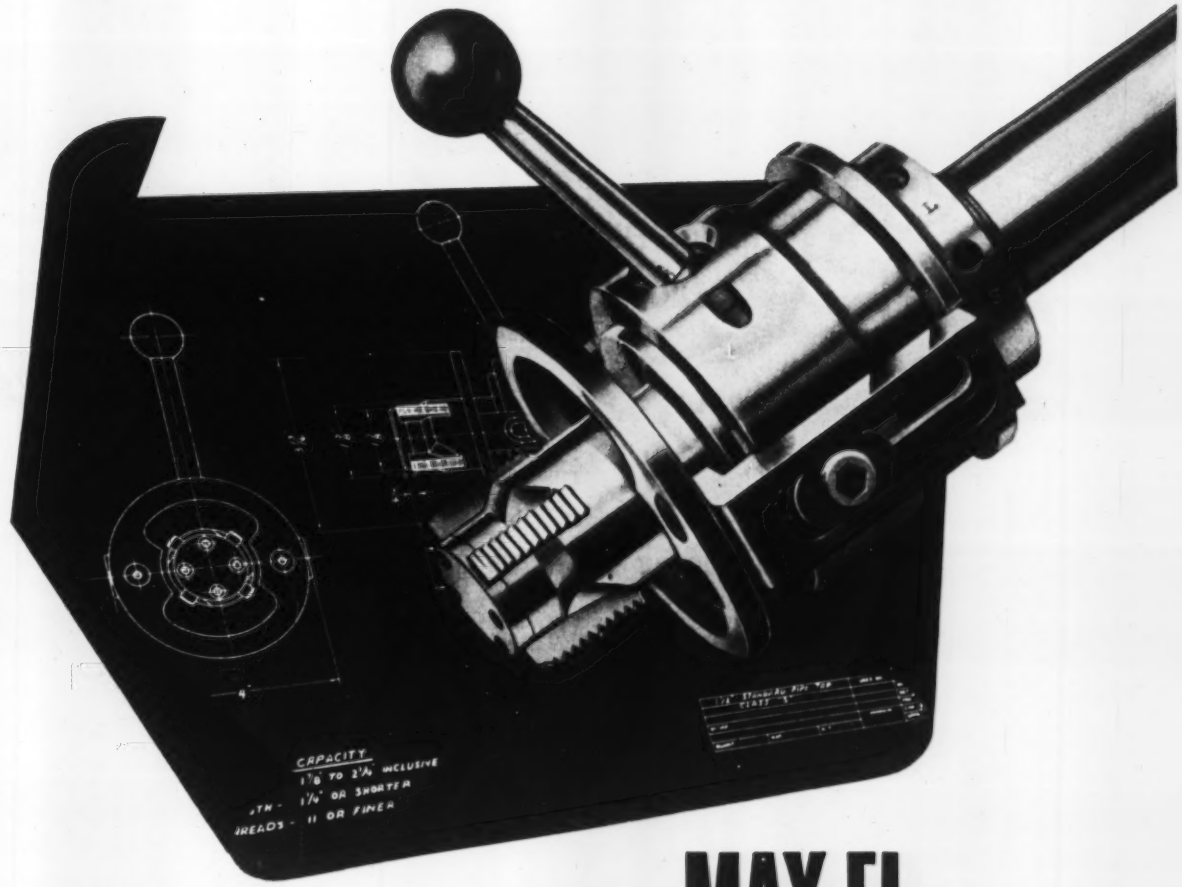
Although several specifications use yield point for control, it seems useless in dynamically-stressed parts designed on endurance fatigue limit. There's a relationship between tensile strength and endurance limit, but not with yield point. In the case of static stresses, you generally shouldn't load heavier than the yield point.

Modulus of Elasticity—Modulus of elasticity (E) in tension is connected closely with tensile testing. Average modulus of elasticity for cast steel is 30 x 10^6 no matter what specification, grade or heat treatment.

The modulus of elasticity for S.G. iron is 25 x 10^6 in both as-cast and annealed conditions. This type material gives a straight line stress-strain relationship, the same as cast steel and malleable iron. But this modulus only applies where there is more than 90 per cent nodular graphite in the casting. It becomes lower as the percentage of nodular graphite drops.

Modulus of elasticity is 25 x 10^6 for the standard malleable irons (Specification A47). No figure is available for pearlitic malleable, but it's probably the same on standard malleable. Gray iron, being so heterogenous in structure, has no true modulus of elasticity. When accurately tested it exhibits no straight line stress-strain curve. Only an average modulus can be given which can be used with safety.

This is the second in a series of four articles on cast ferrous metals by Mr. Eagan. The first covered specifications. Succeeding articles will discuss fatigue limits, wear and castability—and some of the more unfavorable points foundrymen usually don't talk about.



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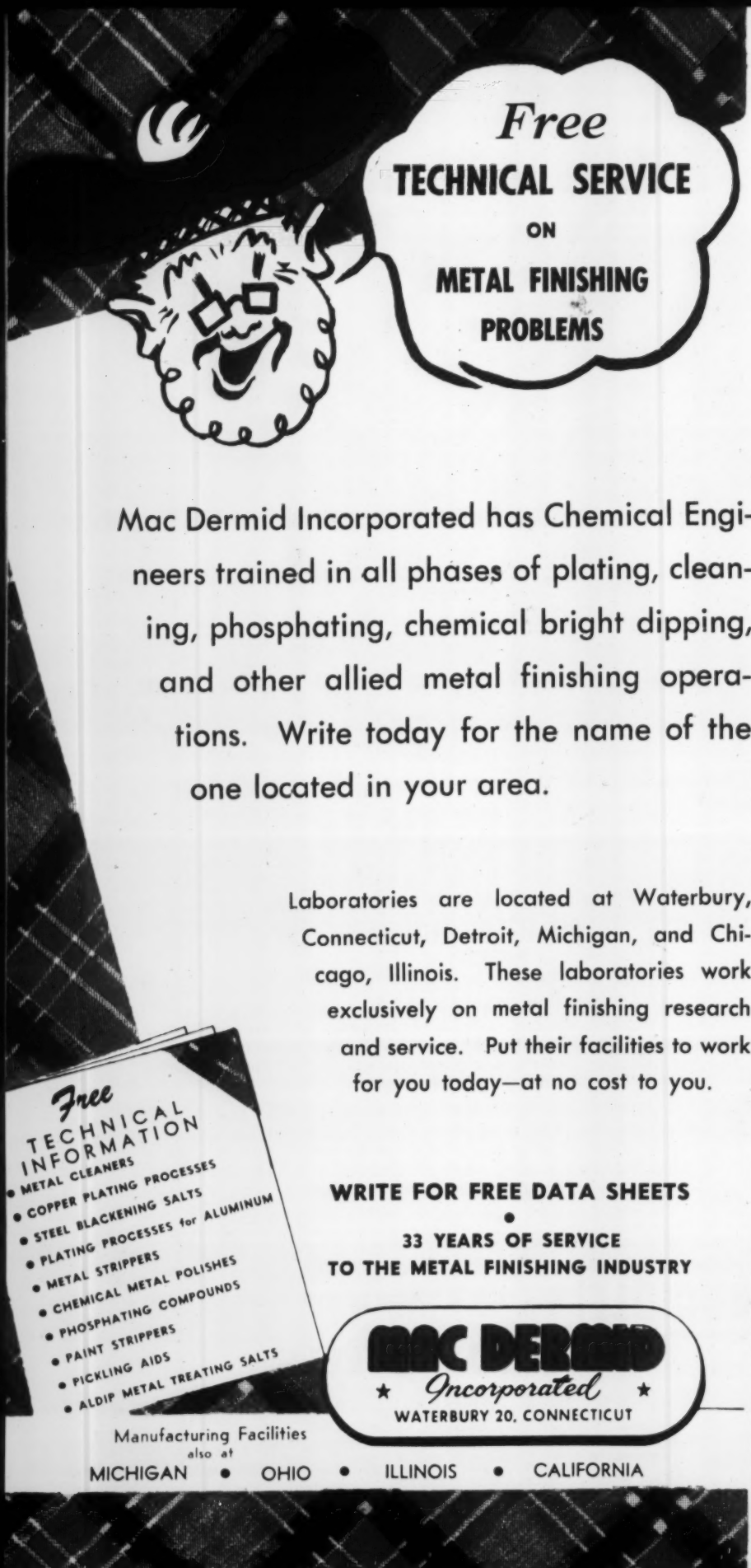
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Progress . . .

(*Continued from p.* 102)

of iron, the heating value of the associated gas is equivalent to about ½-ton of coal.

Various Stages Are Involved—The gas cleaning plant in most blast furnace installations consists of the preliminary stage (dry dust catchers), the primary stage (water scrubbers) and the secondary stage (water flushed electrical precipitators).

Dust content of the gases by the time they have passed through washers or scrubbers has been reduced to about 0.1 to 0.3 grain per cu ft. The precipitator further cleans this gas to a final dust content usually ranging from 0.005 to 0.01-grain per cu ft.

The pipe precipitator is used with a continuous water overflow system to accomplish this secondary cleaning. The upper ends of the pipe collecting electrodes are fitted into a header plate, which is divided into ponds by vertical metal strips welded to the header. The ponds enclose uniform groups of pipe. An adjustable weir ring is fitted to the top of each pipe, and the top of all weirs are adjusted to the same level.

Controlled water volume is supplied to each pond, which overflows the weirs and forms a uniform liquid surface over the inside surface of each pipe electrode. Dust is precipitated on the water film and carried to the bottom of the precipitator to drain and seal.

These units are produced in standard sizes, with or without double partition walls and with either side or top inlet connections. They can be designed for almost any efficiency.

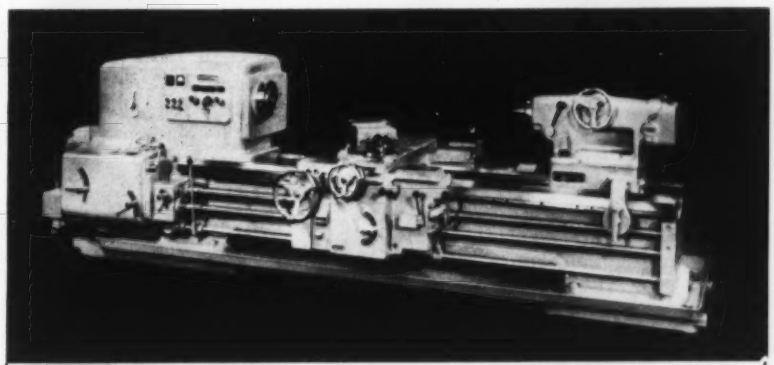
Water consumption ranges, in general, from 150 to 300 gallons per 100,000 cu ft of gas and power consumption from 0.4 to 1 kwh per 100,000 cu ft of gas. Pressure drop is usually less than ½-in. water.

Other metalworking applications of continuing importance include those for smelters and zinc sintering machines. These and others will be discussed in the next installment.

(*To be continued*)

NEW PRODUCTS and equipment

Reply card on page 127 will bring you free literature, editorial clips or more information on new products and equipment described or advertised in this issue.



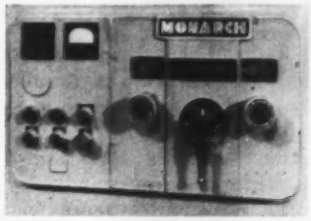
Lathe Sets Sights on Carbides

A heavy duty lathe, designed to permit carbide tooling to be used to the fullest advantage on work of considerable size, will be offered in three models, each with a main drive motor capacity equivalent to 60 hp. The series 90 Dyna-shift model 2500 swings 25 in. over the cross slide, with a clearance diameter of 40 in. Model 2501 swings 31½ in. over the cross slide, with a clearance diameter of 44 in., and model 2502 36½ in. over the cross slide with a clearance diameter of 48 in.

The outstanding feature is the Dyna-Shift headstock. The operator sets two dials, one for the surface cutting speed, the other for the diameter to be turned. The headstock gears are shifted hydraulically giving the correct spindle speed. Subsequent changes in turning speed on progressive diameters are made in the same manner. The value of the rpm figure is determined automatically.

All electrical controls are grouped at the front of the headstock. There are 36 spindle speeds, operating in a range from 6 to 750 rpm for a speed change ratio of 1 to 125. A high pressure mist system lubricates headstock gears and bearings.

The machine allows heavy depths of cut to be taken at above average surface speeds. It also allows high cycle rates and metal removal rates above 100 cu in. per minute. Monarch Machine Tool Co.



FOR MORE DATA CIRCLE REPLY CARD NO. 1

Cellular Products

. . . two package unit

These foamed in place insulation, flotation and structural reinforcing cellular products have many end uses. They range in weight from 2.5 to 20 lb per cu ft. They're either rigid or flexible.

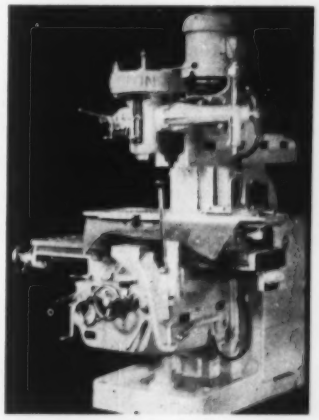
Urefoam is supplied as a two-package unit. It can be mixed on the job to produce foam which expands as much as 30 volumes to fill intricate shapes. It may be mixed continuously or sprayed with special equipment. Atlas Mineral Products Co.

FOR MORE DATA CIRCLE REPLY CARD NO. 2

Milling Machine

. . . multi-purpose

Basically, this machine is a heavy-duty No. 2 or medium-duty No. 3 horizontal mill with a re-



ceptor ram in place of the conventional overarm. It accommodates the standard arbor support brace for operations such as slab milling or straddle milling. The horizontal spindle has a speed range from 25 to 2000 rpm. The spindle has a vertical feed of 3½ in. and

is operated by hand feed lever or worm and worm wheel micrometer feed crank.

Illustration shows the 3-34 Horizontal Mill with Fullwidth Knee. It's equipped with receptor ram, super-speed plain vertical head and ram assembly, duplicator table and tracer head. George Gorton Machine Co.

FOR MORE DATA CIRCLE REPLY CARD NO. 3

Extendable Forks

. . . increase aisle efficiency

The RSAT-3 Yale Warehouser shown here in operation, is equipped with extendable forks. The truck is designed to operate in nar-

row aisles with the hydraulically actuated forks sliding forward to provide 30 in. of effective length beyond the outrigger wheels.

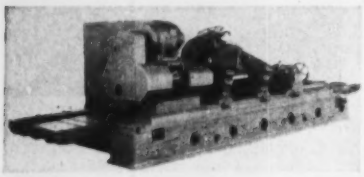
The truck has a rated capacity of 2500 lb at 15 in. load center, has an over-all height of 83 in. and provides a maximum lift of 126 in. Yale & Towne Mfg. Co.

FOR MORE DATA CIRCLE REPLY CARD NO. 4

Roll Grinding Machine

. . . for rolls up to 25,000 lb

In operation, the wheel is traversed across the face of the roll. Crowning and concaving of rolls can be done to precision limits. A



swivel table under the work head and footstock permits grinding of tapers. The roll grinder is made to swing 36 in. diameter work. Lengths between centers are 120, 144, 168, 192, 216 and 240 in.

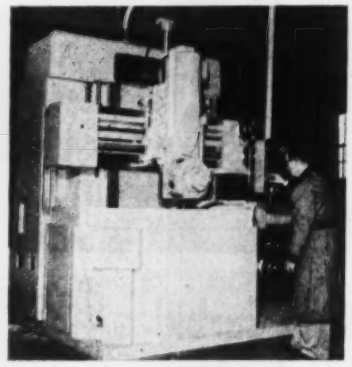
Operating controls are at a central station beside the grinding wheel. Work speeds of the vee belt driven headstock range from 12 to 100 rpm. Work drive is 7½ or 10 hp, depending on the diameter of the roll neck. Landis Tool Co.

FOR MORE DATA CIRCLE REPLY CARD NO. 5

Vertical Turret Lathes

. . . completely redesigned

A pendant control of the Cut Master, model 75, enables the operator to select operational func-



tions from a single station. The unit may be raised and lowered by power and moved right or left in a 180 degree arc manually. Sizes range from 26 to 76 in 10 in. increments. There are 16 feeds from 0.00065 to 0.125 in.

A new type of table support bearing (a combination radial and thrust roller bearing) makes greater accuracy possible at higher speeds. Unit type construction of machine components and smooth external lines have been stressed for cleanliness and simplification of maintenance. Bullard Co.

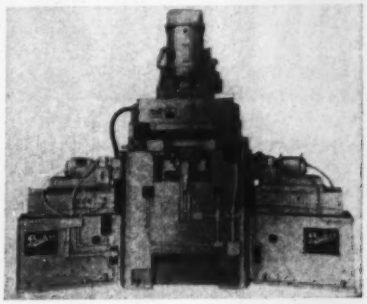
FOR MORE DATA CIRCLE REPLY CARD NO. 6

Special Machine

. . . double-load fixture

This fixture holds two parts per station. The dial type, hydraulic feed multiple spindle machine performs many operations at high production speed on steel-forged automobile front-wheel spindles.

It drills, reams, spotfaces and burrs both sides of four holes and combination drills and chamfers one hole in each part at the rate of 264 pieces per hour. It is equipped with a 36 in. diameter 5-



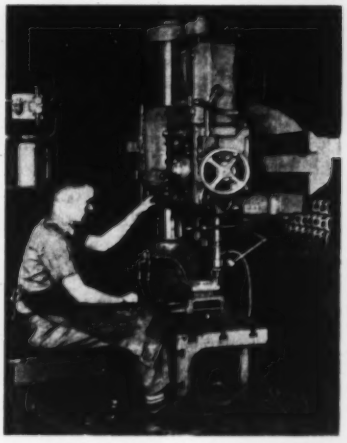
station automatic index table complete with shot bolt. Buhr Machine Tool Co.

FOR MORE DATA CIRCLE REPLY CARD NO. 7

Spray-Lube System

. . . on radial drill

A Spray-Lube system on a Carlton radial drill, according to the company, produced these tapping results: Using a larger tap and working 1⅛ in. thick alloy steel



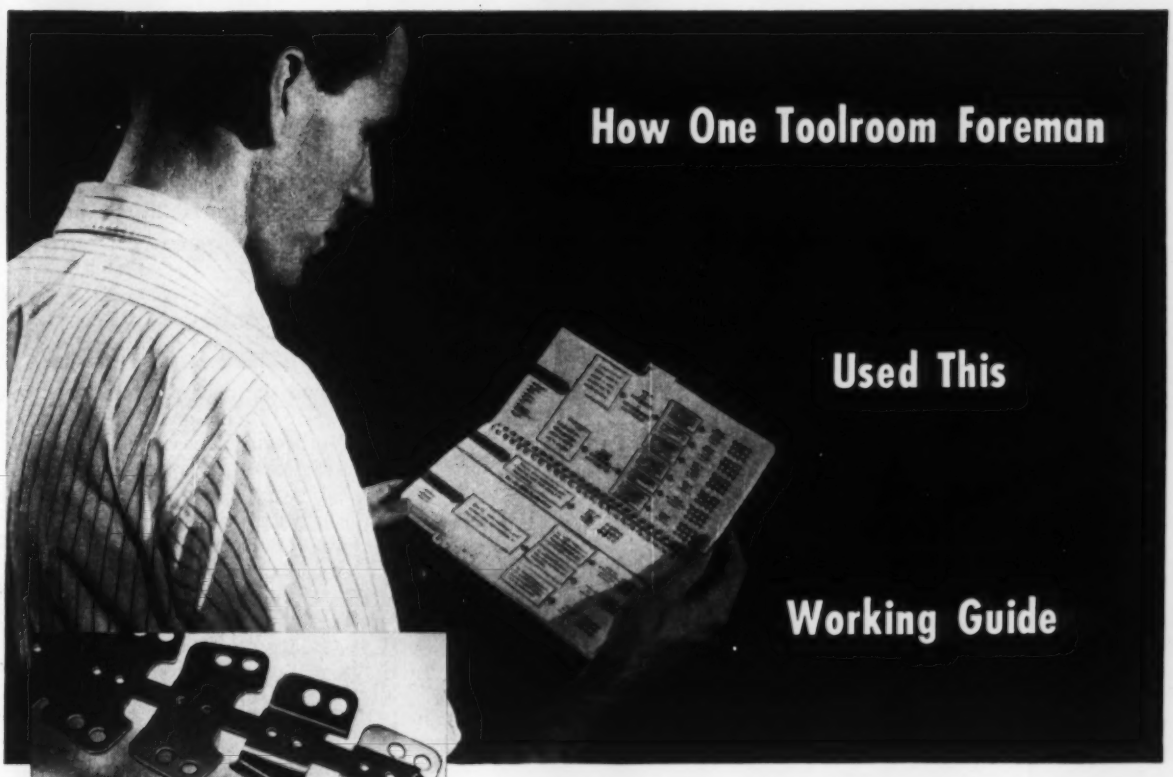
plate, the tap showed only slight signs of wear after drilling three hundred ½ in. holes. At the end of the run the tap turned out twice as much work as the average of four taps used previously. Tap speeds were increased nearly 38 per cent. C. A. Norgren Co.

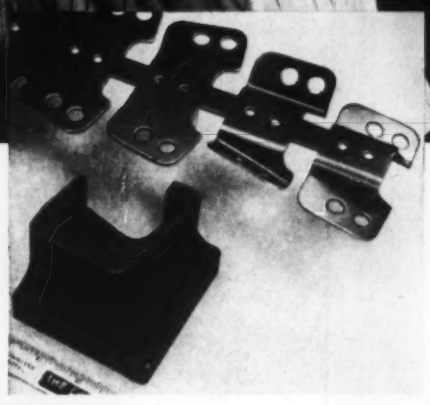
FOR MORE DATA CIRCLE REPLY CARD NO. 8

Throw-Away Tools

. . . carbide inserts

They may be turned over and used on the other side before disposal. Grinding in the user's shop is eliminated and cost per cutting edge is reduced. A new system of





Job: Punch that blanks stampings from SAE 1010 strip, .062" thick.

Problem: The punch is so unbalanced in design that safety in hardening is vital. Also, the punch is shear fitted to the die, and hardening accuracy is necessary to avoid expensive adjustments after heat treating. Other die steels were tried, but they either broke or changed size too much.

Solution: At this point the Toolroom Foreman called in Carpenter and started to become more familiar with the Matched Tool and Die Steel Manual. The Manual pointed to Carpenter *Vega* (Air-Tough) Die Steel for the punch. Now they're coming through right on the nose. Moreover, production between grinds has jumped from about 10,000 to 50,000 stampings. And the Foreman says that from here on, all his tools and dies will be made from Carpenter Matched Tool and Die Steels. (Write for a more detailed Field Report on this job.)

. . . To Increase Tooling Productivity

This is for the man responsible for tools and dies who looks at a diemaking job with these thoughts:

"How can I make it *easier?*"

"How can I avoid costly *heat treating hazards?*"

"What can I do to *improve the job?*"

If you're that man, Carpenter wants to help. We offer you plain, *practical* help based on almost 70 years' experience working with other men who feel like you do.

How does it pay off? Look at a typical example shown to the left! And your Carpenter representative can show you many more Field Reports of other interesting jobs.

Much of this help is packed into a 189-page working guide . . . Carpenter's "Matched Tool and Die Steel Manual". And that's only part of the program . . . a program backed by *dependable* die steels developed in Carpenter Research Laboratories with a long record of pioneering in new and improved steels.

We're ready to work with you, now. A call to your nearest Carpenter Mill-Branch Warehouse, Office or Distributor will tell us you are, too. THE CARPENTER STEEL CO., 139 W. Bern St., Reading, Pa.

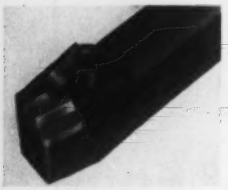
Carpenter STEEL — **Matched Tool and Die Steels**

IMMEDIATE DELIVERY from local warehouse stocks

Export Department: The Carpenter Steel Co., Port Washington, N. Y.—"CARSTEELCO"

chip control is provided and may be indexed in seconds.

The tooling comes in two types: Kendex button tools and heavy



duty Kendex tools. On the button tools, a removable chip-breaker is used. In the heavy duty line a hardened clamp serves as a chip deflector. The illustrated tool is representative of the line. Kennametal Inc.

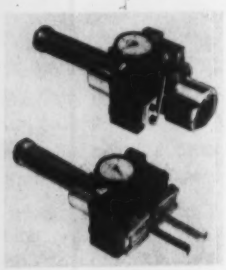
FOR MORE DATA CIRCLE REPLY CARD NO. 9

Gage

. . . interchangeable segments

These segments allow internal threads and internal grooves to be checked with one gage. Model P-21 is built on the principle of an expanding plug, which actuates a precision dial indicator showing the size comparison of the part to a master setting ring.

The top photo shows the gage with segments for checking internal threads 5/16 to 5 in. in diam-



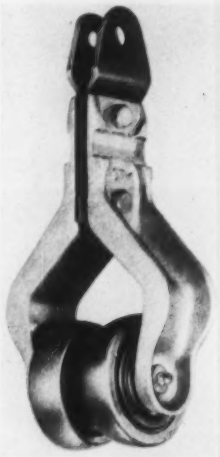
eter. The bottom photo shows it with segments for checking internal grooves up to 5 in. in diameter and grooves at depths up to 1 to 2 in. from a face. Bryant Chucking Grinder Co.

FOR MORE DATA CIRCLE REPLY CARD NO. 10

Ball Bearing Trolleys

. . . for overhead conveyors

The series 500 trolleys are rugged and simple in design. They're engineered to assure rolling contact with the track at all positions. Link-Belt bearings, with ball and cage assembly and concentrically ground raceways, keep friction at a minimum. Wheels are steel; their treads are machined and hardened to give maximum life. The brackets are forged steel.



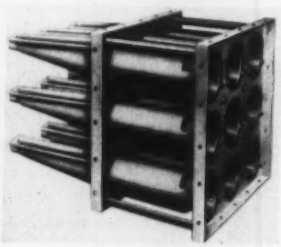
The trolleys are available in two types: Bolted wheel and bracket assembly, for ease of assembly and disassembly; riveted, for permanent assembly of wheel and bracket. Link-Belt Co.

FOR MORE DATA CIRCLE REPLY CARD NO. 11

Dust Collector

. . . granular, compact

Heart of the development is a conical inlet which imparts a swirling motion to dust particles, while



permitting clean air to travel through the type G Amerclone tube without changing direction. Each tube has an approach velocity of 1000 fpm and a cleaning capacity of 333 fpm.

Because of this outside-in twist that reverses the normal tangential flow of most centrifugal dust collectors, the unit can handle widely fluctuating air volumes and dust concentrations. American Air Filter Co. Inc.

FOR MORE DATA CIRCLE REPLY CARD NO. 12

Plastic Sheeting

. . . reinforced

This moldable, glass-in-plastic laminate sheeting is for structural jobs. Called Scotchply, it is said to overcome variability in proper-

ties and the need for handwork in layup or production.

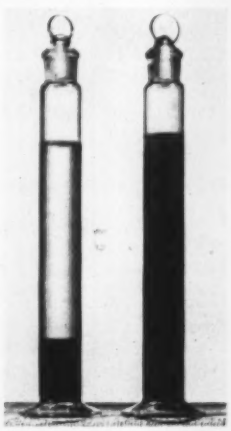
Features: Process means uniformity of properties; the unique method of plying sheets together within the laminate to attain either directional or isotropic strength patterns, coupled with high internal ply-to-ply adhesion; high adhesion of resin to glass. Minnesota Mining & Mfg. Co.

FOR MORE DATA CIRCLE REPLY CARD NO. 13

Coagulant

. . . decreases material loss

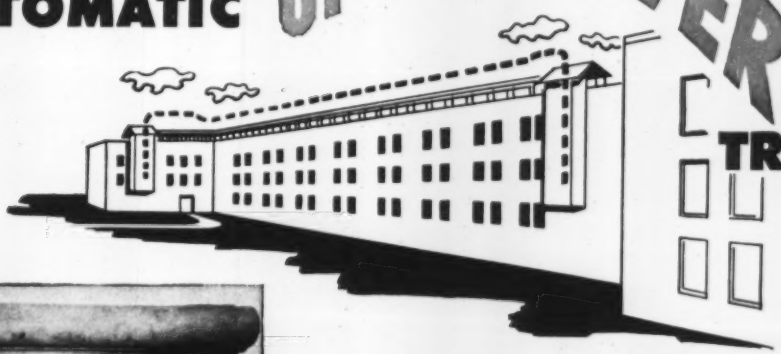
This material is said to offer a better solution to almost all prob-



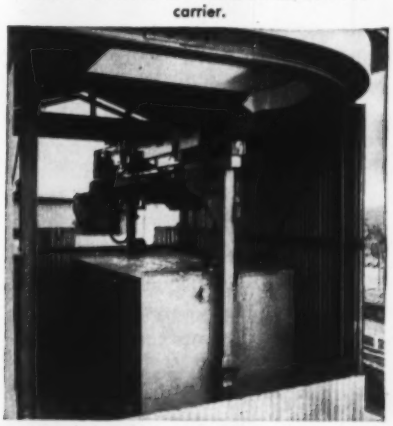
lems where a separation of material from a water suspension is necessary. It is effective in dosages as small as one part per 2 million parts of dispersed solids. It is said to have a high capacity for increasing the filtration rate in separation processes. In certain situations, the total moisture content of the filter cake may be reduced as much as 5 per cent.

It is effective over a wide pH range, and it may be stored indefinitely. A synthetic, water-soluble polymer, it is manufactured as a white amorphous flake to be

AUTOMATIC "UP AND OVER"* TRANSFER



Three boxes—450 lbs. each—are loaded in car. When doors are closed the car raises to carrier.

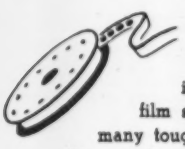


When car reaches upper limit, the Mono-Tractor propels carrier on the MonoRail to No. 2 mill.

SAVES $30,000 PER YEAR

Here is an "Up-and-Over"* system that eliminates 72 hours of handling labor per day. It automatically transfers 180 full bobbin boxes from three floors of one mill to one floor of another and returns the empties. Estimated savings in labor, trucks, floors and traffic congestion run upwards of $30,000 per year.

It is another of the many examples of American Mono-Rail engineering for low-cost handling within space limitation. Let one of our field representatives explain further the versatility and low maintenance of American Mono-Rail equipment.



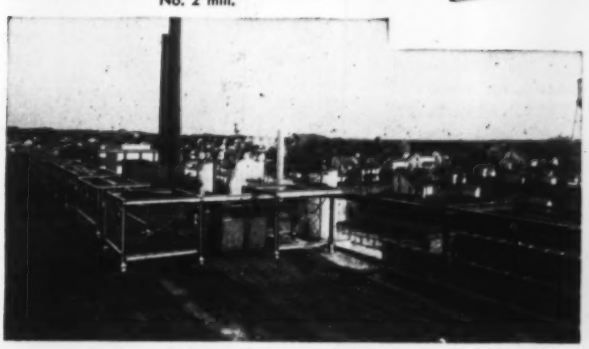
***"UP-AND-OVER"**

is the title of our 16-mm. sound film showing how MonoRail solves many tough handling problems. Please allow us three weeks to schedule showing.

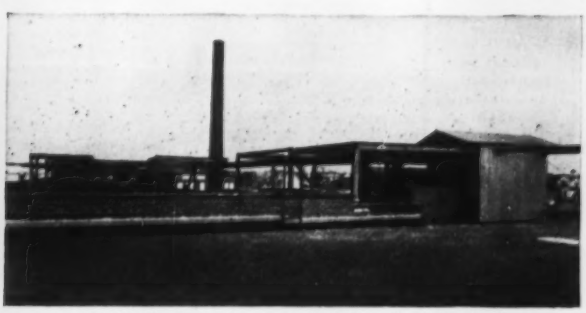
AMERICAN MONORAIL COMPANY

OVERHEAD HANDLING EQUIPMENT

13102 ATHENS AVENUE • CLEVELAND 7, OHIO



Carrier travels at 50 f.p.m. around curves—150 f.p.m. on straight track with slow approach at towers.



At No. 2 mill car lowers to third floor for delivery of full boxes and return dispatch of empties.

dissolved and applied as a dilute aqueous solution. Illustration shows settling rate with treatment (left); without treatment (right). Picture was taken 30 seconds after treatment. Dow Chemical Co.

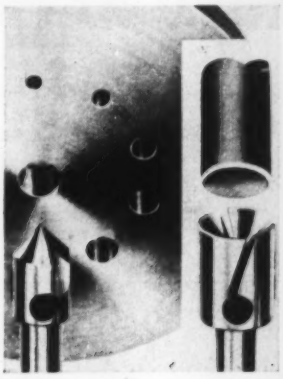
FOR MORE DATA CIRCLE REPLY CARD NO. 14

Deburring Tools

. . . two types, all materials

One tool is for openly accessible hole faces, the other for the outer ends of rods, tubes and bosses. Low torque design permits rapid offhand workpiece handling without chatter or development of secondary burr. Controlled cutter entry prevents snagging, seizing or excessive cutting. Both tools are of two-piece construction, permitting cone faces to be cylindrically ground on tool and cutter grinders or a lathe with a tool post grinder.

Range of application extends from less than 1/16 in. holes up to body diameter. Tools are furnished with a 90 degree included angle and are made from high



speed steel, which is heat treated and precision ground. Nobur Mfg. Co.

FOR MORE DATA CIRCLE REPLY CARD NO. 15

Silver Brazing Alloy

. . . for 400 Stainless

Developed to overcome crevice corrosion problems in brazing the 400 series of straight chromium stainless steels, the alloy contains 63.0 per cent silver, 28.5 per cent copper, 6.0 per cent tin and 2.5 per cent nickel. It melts at 1325° F and flows at 1475° F. It does not flatten out at brazing temperatures.

RSNI is available in wire of any standard gage. Handy & Harman.

FOR MORE DATA CIRCLE REPLY CARD NO. 16

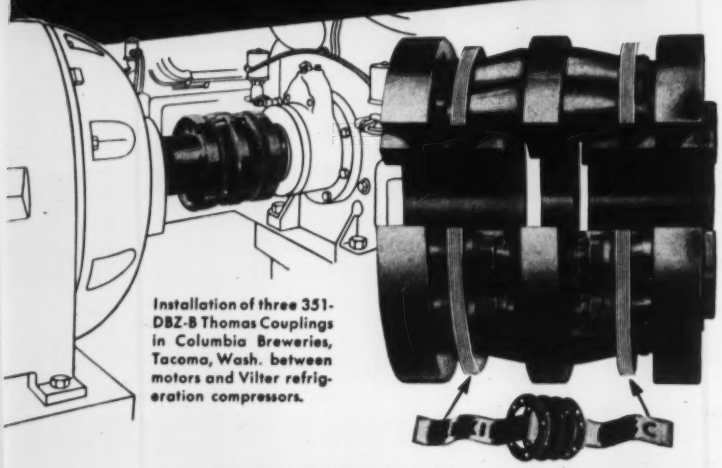
Stud Welding Gun

. . . no side cable loop

The gun has two different sizes of cable. One is for welding studs with diameters up to 1½ in., the

other for any diameter from 10 gage up to 1 in. and greater. It has a swept-back handle through which the cables enter a steel bar-

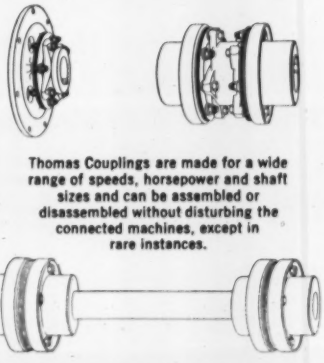
THOMAS FLEXIBLE COUPLINGS...
for more years of better service!



Installation of three 351-DBZ-B Thomas Couplings in Columbia Breweries, Tacoma, Wash. between motors and Vilter refrigeration compressors.

Patented Flexible Disc Rings of special steel transmit the power and provide for parallel and angular misalignment as well as free end float.

DISTINCTIVE ADVANTAGES	
FACTS	EXPLANATION
NO MAINTENANCE	Requires No Attention. Visual Inspection While Operating.
NO LUBRICATION	No Wearing Parts. Freedom from Shut-downs.
NO BACKLASH	No Loose Parts. All Parts Solidly Bolted.
CAN NOT "CREATE" THRUST	Free End Float under Load and Misalignment. No Rubbing Action to cause Axial Movement.
PERMANENT TORSIONAL CHARACTERISTICS	Drives Like a Solid Coupling. Elastic Constant Does Not Change. Original Balance is Maintained.



Thomas Couplings are made for a wide range of speeds, horsepower and shaft sizes and can be assembled or disassembled without disturbing the connected machines, except in rare instances.

Write for our new Engineering Catalog No. 51A

THOMAS FLEXIBLE COUPLING COMPANY
Largest Exclusive Coupling Manufacturer in the World
WARREN, PENNSYLVANIA, U.S.A.

NEW KENDEX* tooling slashes cost per cutting edge

It's entirely new . . . everything except the long-established Kendex "throwaway button" principle pioneered and proved by Kennametal.

We took a good look at tool cost per cutting edge and designed a new Kendex with a clamp-on, "turnover" insert, plus a new system of chip control. This combination eliminates all regrinding, doubles the usable cutting edges per insert, and slashes tool cost on all types of machining operations. For example: On one job, tool cost was cut from $1.13 to $0.06 per piece.

NEW "TURNOVER" INSERTS

The new "turnover" inserts are designed with cutting edges on both sides, and can be indexed in seconds. After all cutting edges are used on one side, simply turn them over and use an equal number on the reverse side. Square inserts have eight cutting edges; triangular inserts, six.

These cost-reducing inserts are available in two types: (1) Regular, ground on top and bottom with corner radii ground for indexing; (2) Precision inserts, ground on all sides for precision indexing. When all edges are used . . . replace the insert and eliminate regrinding.

The new Kendex comes in a range of sizes in two models—Standard and Heavy-Duty. The Standard model is available with either Regular or Precision inserts; the Heavy-Duty with Regular inserts only.

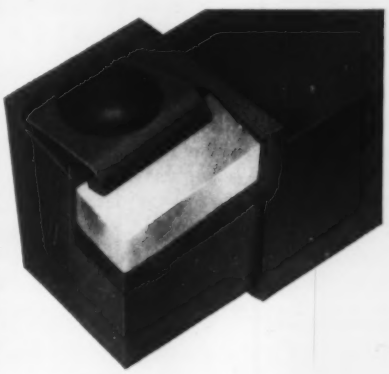
NEW CHIP CONTROL SYSTEM

The new Kendex design not only eliminates regrinding of inserts, but the grinding of chip breakers as well. Standard Kendex tools have replaceable carbide chip breakers which have the widest effective application of any mechanical chip breakers available. On many jobs, the chip breaker can be removed to prolong tool life. Heavy-Duty sizes (shown at right) are fitted with rigid, inexpensive spring clamps which serve as chip deflectors.

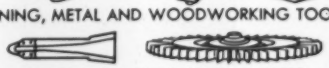
Replaceable, hardened steel shims (available on the larger shanks) prolong tool life, reduce tool maintenance, and eliminate grinding of holders in case of accident with the tool.

For complete information, call your Kennametal representative, or write KENNAMETAL, INC., Latrobe, Pennsylvania.

*Registered trademark

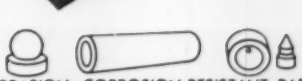


MINING, METAL AND WOODWORKING TOOLS



WEAR AND HEAT-RESISTANT PARTS

INDUSTRY AND
KENNAMETAL
...Partners in Progress



ABRASION, CORROSION-RESISTANT PARTS

PERCUSSION AND IMPACT PARTS

rel extending through the plastic gun body. Electrical connections have been reduced from three to one.

Advantages listed: Accommodation of greater range of stud length without changing adaptors or other accessories; arc length can be adjusted without disassembly; coil design offers greater lifting power. Nelson Stud Welding Division, Gregory Industries Inc.

FOR MORE DATA CIRCLE REPLY CARD NO. 17

Electroplating Process

. . . for barrel plating

Developed for automatic barrel plating, as well as manual and semi-automatic horizontal barrel machines, the process is said to produce a bright zinc plate over a wide range of current densities. The process includes water soluble Stevco Bright Zinc Salt and Stevco Liquid Zinc Brightener.

The resultant surface can be bright dipped or given a chromate treatment. Frederic B. Stevens Inc.

FOR MORE DATA CIRCLE REPLY CARD NO. 18

Duplex Milling Machine

. . . for large, awkward parts

This design further expands a line of duplex milling machines featuring heavy duty, traveling milling heads instead of moving the

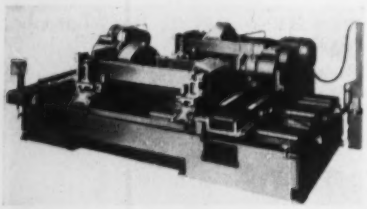


table and fixtures. Two floor mounted, load-unload benches and duplicate sets of work holding fixtures are provided. A traveling milling head is mounted on fixed ways at one end of the machine bed. The saddle is mounted on ways to provide adjustments of 6 in. to 11 ft for the piece being milled. Ways on the saddle provide for mounting the second traveling milling head.

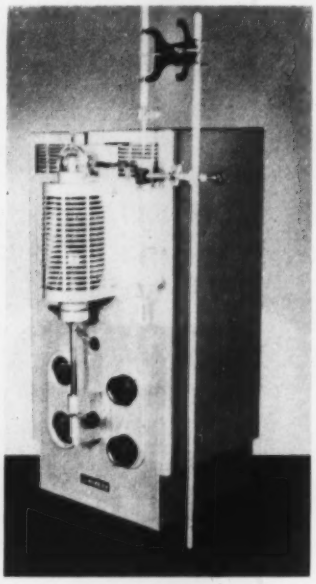
Heads are individually motor driven by 30 hp, 1800 rpm motors. Nonmetallic way liners and hardened and ground steel ways are used. Motch & Merryweather Machinery Co.

FOR MORE DATA CIRCLE REPLY CARD NO. 19

Sulphur Analysis

. . . in petroleum

Fast combustion of heavy and light hydrocarbons is possible with the LI-500P H-F combustion unit. All samples covered by the ASTM



Bomb or Lamp Method can be completely combusted. Samples tested have shown good agreement with data. Fifteen to twenty minutes are required for a complete analysis.

Once the weighed sample is placed in the induction field, the operator devotes his attention to titrating. The titration assembly consists primarily of an absorption cell covered in the ASTM specifications on the Lamp Sulphur Method. Lindberg Engineering Co.

FOR MORE DATA CIRCLE REPLY CARD NO. 20

Induction Heater

. . . with 5 kw unit

Designed for brazing, soldering, surface hardening and selective annealing, the heater can be adjusted to operate at maximum efficiency with a wide variety of inductor coils.

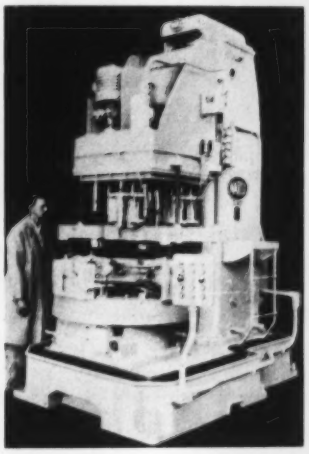
A variable transformer coupling has a new 5 kw unit, which makes it workable where a 10 kw or larger heater was required. By turning a crank, the operator can vary work coil current. Other models are available in the 5 kw line for applications which don't require a transformer. They are equipped with grid control rectification. General Electric Co.

FOR MORE DATA CIRCLE REPLY CARD NO. 21

Drilling, Tapping Machine

. . . four-position fixture

The heavy duty vertical Holesteel combination driller is capable of drilling, reaming, spot-facing



and tapping 27 transmission rear bearing retainers an hour.

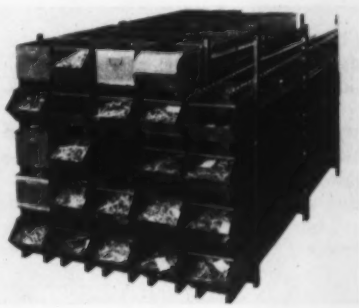
The machine is provided with a four position fixture, mounted on an eight position indexing table. It is arranged to accommodate two parts in different locations in each position. National Automatic Tool Co. Inc.

FOR MORE DATA CIRCLE REPLY CARD NO. 22

Flow Rack

. . . conveyorized storage

Combining gravity wheel track with Rapistan rack components,



this materials handling device is said to cut inventory and stock handling steps to a minimum. This rack moves goods to its front, where

FORMED COMPLETE-*AUTOMATICALLY!*

NILSON FOUR-SLIDES

Combine Operations to Lower Costs on Metal Stampings.

ONE Nilson 4-Slide with ONE operator forms parts *faster*, more *accurately* with less *rejects* than with conventional presses. Elimination of secondary handling, lower tooling and set up costs *means added profits.* Wide range of models for wire and ribbon metals. Feed lengths to 32", stock widths to 3½". Press capacity to 75 tons.

For specific recommendations — send details of your operation.

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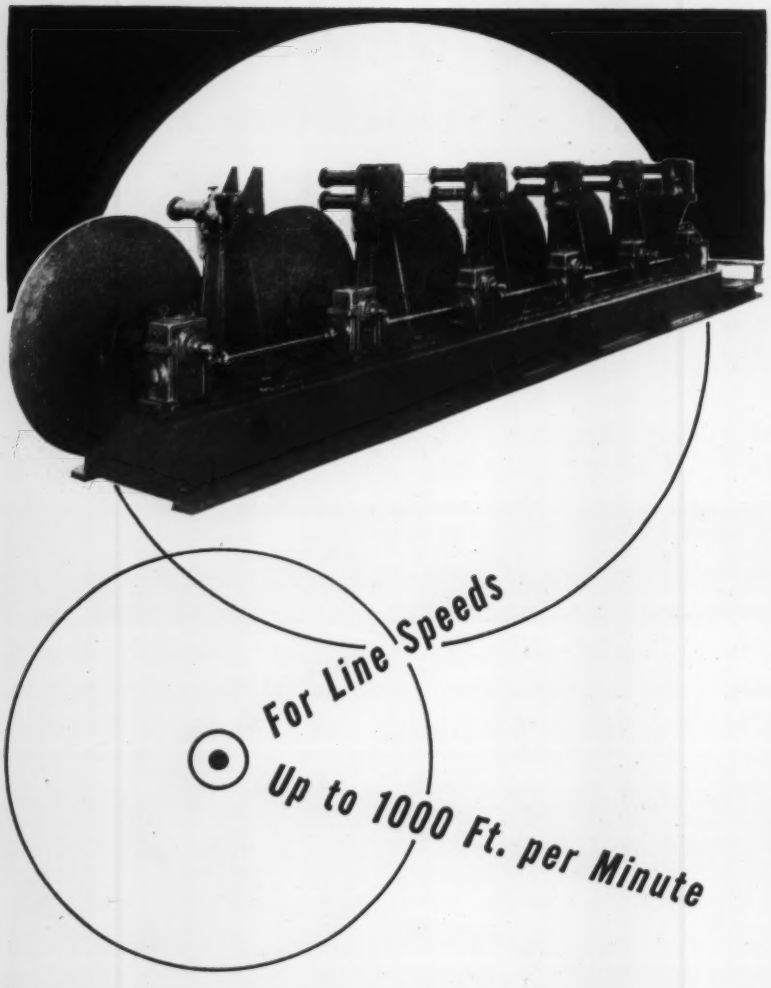
Write, Wire, Phone for full particulars.

THE A. H. NILSON MACHINE COMPANY

1512 Railroad Avenue • Bridgeport 5, Connecticut

Automatic Chain-Making Machines • Automatic Staple Forming Machines • Wire and Stock Reels • Foot Presses • Wire Straightening Equipment • Slide Feeds for Presses



H & S Reducers are Used

Illustrated above is a Steel Equipment Company 6-Block Take-up Frame in a High Speed Precision Slitting Line . . . six reels each handling a separate strand of Venetian blind steel .008" thick . . . 12" strands are cut into six 2" strands and each one is wound on a separate block . . . line speeds up to 1000' per minute. Each reel is driven by an H&S WB-1200 Worm Gear Speed Reducer . . . selected for their *compactness and high efficiency.* Just another example that for reliable engineering, construction and quality . . . it's always Horsburgh & Scott.

THE HORSBURGH & SCOTT CO.
GEARS AND SPEED REDUCERS
5112 Hamilton Avenue
Cleveland 14, Ohio

Send note on Company Letterhead for 488-Page Catalog 49

NEW PRODUCTS and equipment

efficient selection can be made.

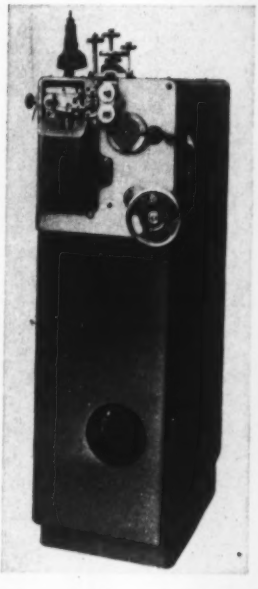
The rack is made of rolled steel and has a corrosion resistant baked enamel finish. It is 6 ft high for normal reach, but may be any width or length over-all, and is adaptable to the size, weight and nature of any product. Rapids-Standard Co. Inc.

FOR MORE DATA CIRCLE REPLY CARD NO. 23

Spring Maker

. . . many design changes

Weighing 695 lb, the W-10A Springmaker can handle 0.008 to 0.028 in. wire up to 24 in. in length. Outside diameter of the machine's coils range from 1/16 to 7/8 in. It measures 21 in. across the front at the base and is 28 in. deep. Wire line height is 4 ft.



Interior and exterior design changes result in more convenient placement of controls and provision for mounting additional mechanisms on the face of the machine's front housing. One notable change is the relocation of the handwheel. Either a ½ hp motorized variable speed transmission or a ¾ hp electronic type adjustable speed drive may be used. Two drives can be used, either a ½-hp motorized variable speed transmission on a ¾-hp electronic type adjustable speed drive. Torrington Mfg. Co.

FOR MORE DATA CIRCLE REPLY CARD NO. 24

FREE LITERATURE

Catalogs and Clip Sheets

Use these reply cards to bring you free literature, editorial clips or more information on new products and equipment described or advertised in this issue.

Turret Lathes

Bullard Co. covers its redesigned version of vertical turret lathes, the Cut Master Model 75—19 pages.

FOR A FREE COPY CIRCLE REPLY CARD NO. 25

Spray System

C. A. Norgren Co. describes its Spray-Lube System (single and multi-point application of liquids) for a wide range of metal cutting and forming operations—6 pages.

FOR A FREE COPY CIRCLE REPLY CARD NO. 26

Screening Equipment

Link-Belt Co. line of screening equipment for removal of solids from water, sewage and industrial waste is covered—Book No. 2587, 28 pages.

FOR A FREE COPY CIRCLE REPLY CARD NO. 27

Stainless Steel Uses

Crucible Steel Co. of America offers "A Guide to Future Uses of Stainless Steel in Architecture and Building"—24 pages.

FOR A FREE COPY CIRCLE REPLY CARD NO. 28

Metals

Coast Metals Inc. describes the chemical and physical properties of its Metals No. 18. It's furnished as hardsurfacing weld rods or in cast form to customer specs. —4 pages.

FOR A FREE COPY CIRCLE REPLY CARD NO. 29

Copper Plating

Lea Mfg. Co. offers a new technical manual on its Copper-Glo process for bright copper plating —22 pages.

FOR A FREE COPY CIRCLE REPLY CARD NO. 30

Processing Tool

Heyl & Patterson Inc. explains the operation of the Cyclone, showing it as an efficient and low cost processing tool.

FOR A FREE COPY CIRCLE REPLY CARD NO. 31

Packaging

Hinde & Dauch Paper Co.'s "How to Pack It" describes and illustrates a selection of 12 styles and more than 70 types of corrugated boxes—30 pages.

FOR A FREE COPY CIRCLE REPLY CARD NO. 32

Net Price Lists

Threadwell Tap & Die Co. Inc's price list features descriptions of its line of taps, dies, counterbores and keyway broaches plotted graphically against the range of product sizes.

FOR A FREE COPY CIRCLE REPLY CARD NO. 33

Speed Reducer Catalog

Brad Foote Gear Works Inc.'s new catalog contains revised rating tables of its herringbone and spiral bevel-helical speed reducer line—Catalog No. 120, 24 pages.

FOR A FREE COPY CIRCLE REPLY CARD NO. 34

Roller Gear Drives

Ferguson Machine & Tool Co. describes its expanded line of standard roller gear drives—Catalog No. 104, 21 pages.

FOR A FREE COPY CIRCLE REPLY CARD NO. 35

Air Control Unit

Bellows Co. illustrates and describes the parts and function of its Electroaire Valve. Installation photos are included—Bulletin AV 300R, 8 pages.

FOR A FREE COPY CIRCLE REPLY CARD NO. 36

Chromate Finishing Data

Allied Research Products Inc. has issued a file of technical literature on Iridite Chromate Conversion Coatings for prevention of corrosion and paint-base treatment of nonferrous metals—8 pages.

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Permanent Molding

Eaton Mfg. Co. offers "The Eaton Permanent Mold Foundry."

For free literature, editorial clips or more information on products described in this section, circle the corresponding number at left. Fill in box below for articles or advertisements not numbered.

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COMPANY _____

PRODUCTS MANUFACTURED _____

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Penton Building
Cleveland 13, Ohio

Readers Service Dept.

It tells the story of permanent mold casting and takes you on a picture-tour of the Eaton plant—32 pages.

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Engine-Generator Sets

Westinghouse Air Brake Co.'s Le Roi Division describes and illustrates seven engine models (60 to 675 hp) with generators capable of producing from 50 to 350 KW—8 pages.

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Low-Alloy Steels

International Nickel Co. Inc. describes a group of high-strength, low-alloy steels, their characteristics, corrosion resistance, etc.—Bulletin A-61, 16 pages.

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Gas Analyzers, Alarms

Mine Safety Appliances Co. details its complete line of combustible gas analyzers and alarms—Brochure No. 0703-3, 20 pages.

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Expanding Mandrels

LeCount Tool Works Inc. announces a folder on its line of precision Universal Expanding Mandrels—4 pages.

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Alloy Steels

Carpenter Steel Co. describes two chrome-nickel alloy steels reported capable of handling 95 per cent of all alloy jobs.

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Magnetic Separators

Eriez Mfg. Co.'s "Nonelectric Permanent Magnetic Separators for Removal of Unwanted Iron" is a detailed compilation of the many types of magnetic installations they produce—Catalog No. 17, 15 pages.

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Centrifugal Castings

Lebanon Steel Foundry has published a brochure on centrifugal castings. Design, manufacture and final application are treated—12 pages.

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Pension Plans

Travelers Insurance Co. offers "The 1954 Revenue Code and Your Pension Plan" and "Pension Plan Funding"—Forms GL-42222 and GI-42220.

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Flame Cutting Equipment

Flame Cutting Equipment Co. describes its new line of equipment for flame cutting with propane gas. Two bulletins are offered.

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Rack Styles

Belke Mfg. Co.'s illustrated catalog describes insulated plating rack sections and insulated contact tips—12 pages.

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Lubricants

Sun Oil Co.'s Technical Bulletin covers its Sunoco Way Lubricant, a "special" for the ways of machine tools.

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EDITORIAL REPRINTS:

Design for Competition

Profit is the real yardstick of good design, says No. 10 in STEEL's Program for Management Series, on p. 81. You have 90 per cent of an effective design team on your payroll now.

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Embrittlement

Hot dip galvanizers can breathe easier, says the article on p. 92. Recent studies have shown that it's cold work that's the culprit behind galvanizing embrittlement. Here are the details.

FOR A FREE COPY CIRCLE REPLY CARD NO. 51

Work Simplification

Thompson Products' program develops the industrial engineering talent of its supervisors. Results: $2 million savings in 6 years. To see how the program is set up, see p. 44.

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Ferrous Metals

Part II, "What Physicals Can You Expect ?" is a rundown of the role played by the significant elements in cast ferrous metals. Knowledge of physical properties is complicated because each casting presents its own problems. P. 112

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10	20	30	40	50	60	70	80	90

11-22-54

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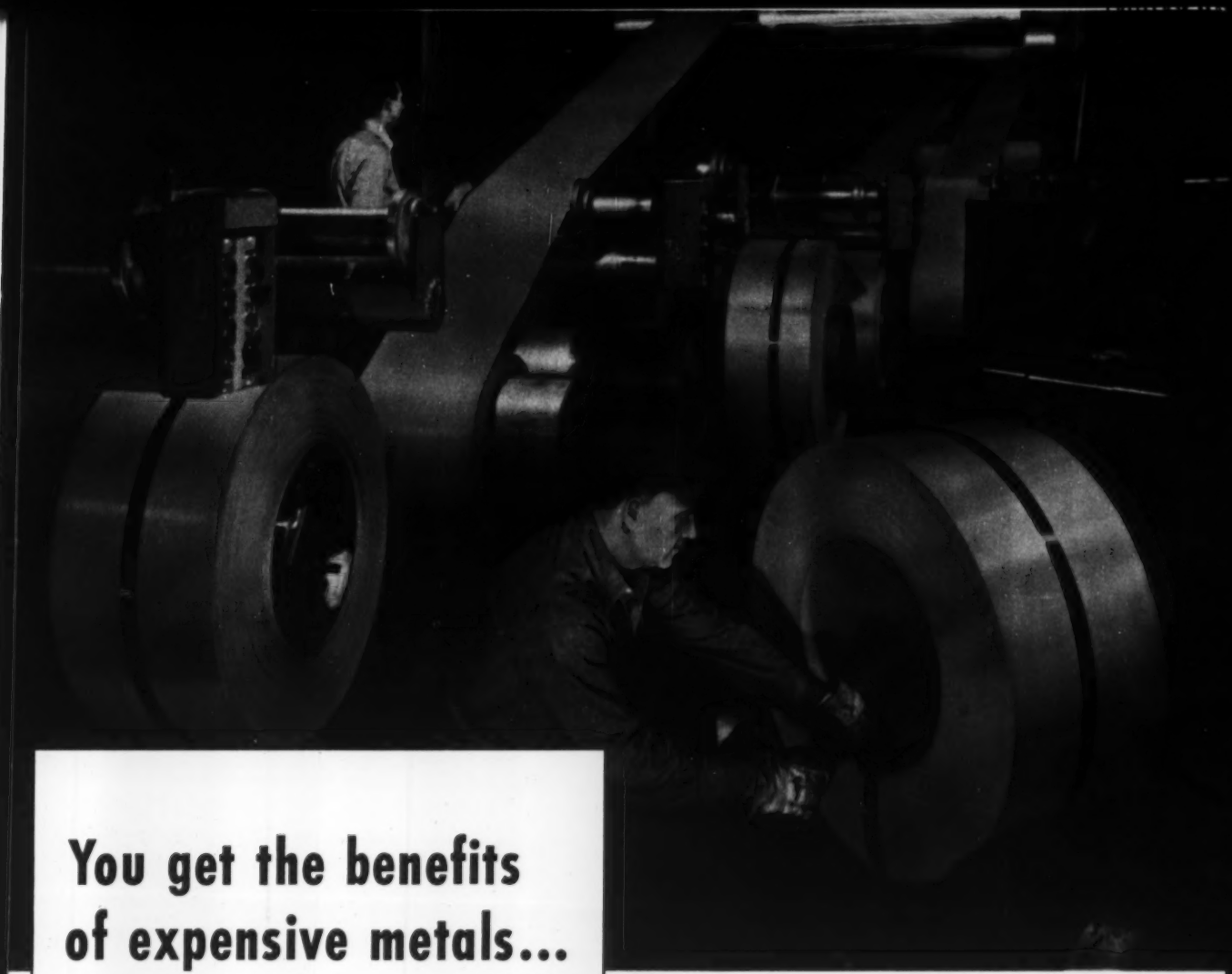


You get the benefits of expensive metals...

without their high costs when you use Thomas pre-coated strip steel in the manufacture of your products. It is available coated with copper (as shown above emerging from one of Thomas' electroplating units), also zinc, brass, nickel, lacquer, tin, or lead alloy in either planished or buffed finishes.

When you use Thomas pre-coated strip steel in the manufacture of your products, you not only produce better looking products but save in plating and fabricating costs, obtain longer die life and get more units per pound of steel.

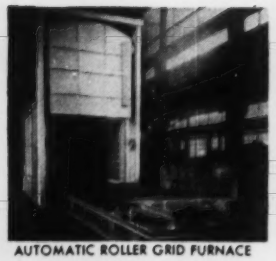
A Thomas sales engineer will be glad to study your fabricating processes and make a proposal that could save you time and money and enable you to make more salable products. Call or write today to get the Thomas story.

Thomas Strip®

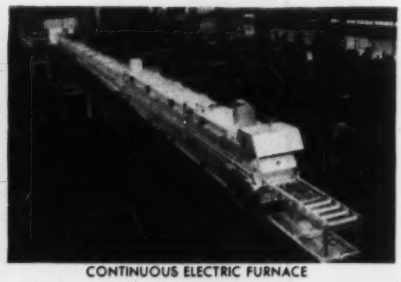
COLD ROLLED STRIP STEEL

Thomas Strip Division

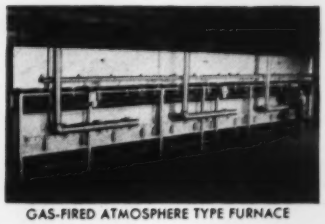
Pittsburgh Steel Company • Warren, Ohio



AUTOMATIC ROLLER GRID FURNACE



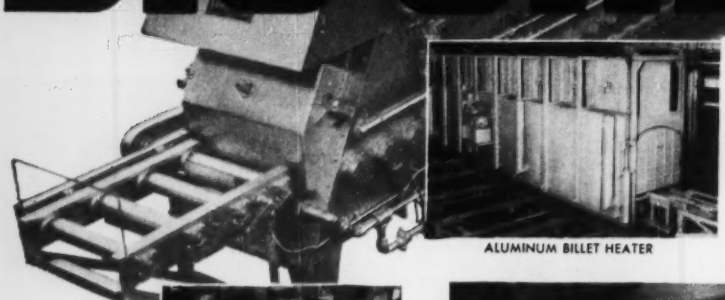
CONTINUOUS ELECTRIC FURNACE



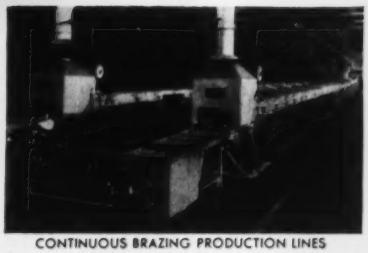
GAS-FIRED ATMOSPHERE TYPE FURNACE

BIG ONES

AUTOMATIC ROTARY HEARTH FURNACE



ALUMINUM BILLET HEATER



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CONTINUOUS ROTARY RETORT FURNACE

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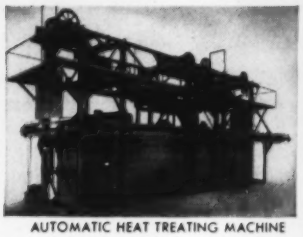
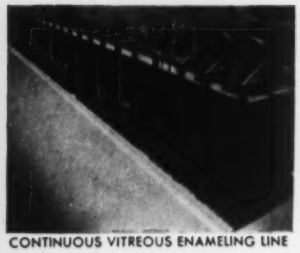


AUTOMATIC HEAT TREATING MACHINE



CONTINUOUS VITREOUS ENAMELING LINE

. . . all field-erected by Lindberg

Maybe you haven't heard the news. Lindberg is now set up to field-erect any type of industrial heating or processing installation. Here are just a few of the large field-erected installations already put up by Lindberg. More are being built right now.

You get a complete package deal from Lindberg. Expert engineers consult with you and analyze your needs. Then they plan and design an installation to meet your specific requirements, whether you need a single furnace or a complete production line. And Lindberg will build it for you, right in your own plant.

To get on-the-spot service from an expert Lindberg engineer, just call your nearest Lindberg Field Office (you'll find the number in the classified section of your phone book, or in the Trade Directories).

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Market Outlook

THE STEEL BUYER is going to be a busier man from here on. He'll be buying more steel, and he'll have to do more advance planning.

Here's why: Inventory reduction is over, so he'll have to raise his buying up to the level of consumption. As the over-all demand for steel increases, delivery times lengthen. To make sure steel will arrive when needed, he will have to be more careful in his order planning. He'll have to order earlier.

HIGH FOR THE YEAR— Heralding the end of widespread reduction of steel inventories, steel ingot production bounced up near the level of consumption and registered 79 per cent of capacity in the week ended Nov. 21. That's a 1.5-point rise over the preceding week. It puts the rate up to the highest level since the middle of last December.

In rising to 79 per cent of capacity, the ingot rate went a long way toward reassuming its role as a good gage of business conditions. People used to say: "As goes steel so goes business." But until now the ingot rate this year has been markedly below the level of steel consumption and business in general.

WHAT TO EXPECT— It looks like this year's ingot output will total 85,518,000 net tons, or 68 per cent of capacity. That represents about 63.3 million tons of finished steel. STEEL calculates that consumption of finished steel will be as much as 71.1 million tons this year. That means users relied on their inventories for 7.8 million tons of finished steel—mainly in the first nine months of this year.

GOOD YEAR— Consumption of finished steel at an annual clip of 71.1 million tons has been exceeded in only three years—1950, 1951 and 1953. If finished steel were being produced at that pace this year, we would need an ingot rate of 94.8 million tons.

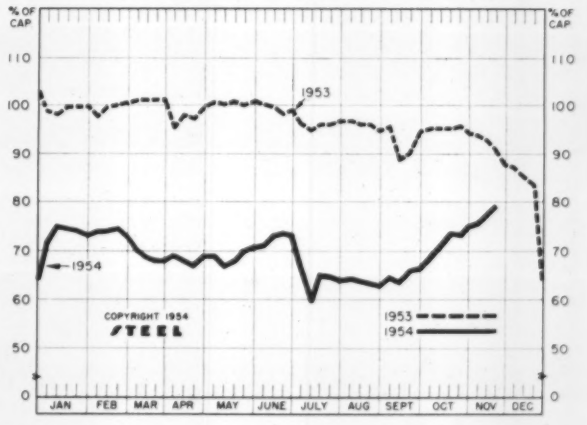
Steel production at 94.8 million tons is equal to 76 per cent of present ingot capacity. Some of the steel company analysts have been thinking that next year's steel ingot rate will average around 75 per cent of capacity, and most forecasts of business in general are for a slight increase. If the current 79-per-cent ingot rate accurately reflects business conditions, we could expect the steel rate next year to range between 75 and 80 per cent of present capacity. That would give an ingot output of from 93.2 million to 99.5 million net tons. The record, which was set last year, is 111,609,719 tons.

ANOTHER LOOK AT '54— Blast furnace output in 1954 will be at a little higher rate than steel ingot production because steel producers increased their reliance on pig iron and cut their usage of scrap in making steel. STEEL estimates that blast furnace production this year will total 58,233,000 net tons—71 per cent of capacity. Last year, blast furnaces yielded 75,856,872 net tons.

UPS AND DOWNS— Now that seasonal factors are in full reign again, some forms of finished steel are in increasing demand while others are easing.

PRICES STEADY— The downtrends and the uptrends balance out sufficiently to keep prices steady. STEEL's arithmetical price composite on finished steel holds at $117.95 a net ton. Steelmaking scrap is steady, too, at $33.67 a ton.

NATIONAL STEELWORKS OPERATIONS



DISTRICT INGOT RATES

(Percentage of capacity engaged)

	Week Ended Nov. 21	Change	Same Week 1953	Same Week 1952
Pittsburgh	75	— 0.5*	81	105
Chicago	81.5	+ 0.5*	98	113.5
Mid-Atlantic	71	+ 1	90	101
Youngstown	82	+ 6	96	106
Wheeling	92	+ 0.5	98	100.5
Cleveland	87.5	— 0.5	99	112.5
Buffalo	97.5	+ 2	100	106.5
Birmingham	64	0	96.5	106
New England	58	— 1	85	85
Cincinnati	76	+ 1	59.5	90
St. Louis	83.5	— 3.5	90	86
Detroit	80	0	97.5	106
Western	86	0	94	104
National Rate	79	+ 1.5	90.5	106

INGOT PRODUCTION‡

	Week Ended Nov. 21	Week Ago	Month Ago	Year Ago
INDEX (1947-1949=100)	117.2†	116.7	110.1	127.2
NET TONS (In thousands)	1,882†	1,874	1,769	2,044

*Change from preceding week's revised rate. †Estimated. ‡Amer. Iron & Steel Institute. Weekly capacity (net tons): 2,384,549 in 1954; 2,254,459 in 1953; 2,077,040 in 1952.

Metalworking Outlook—p. 33 Technical Outlook—p. 91

Price Indexes and Composites

FINISHED STEEL PRICE INDEX (Bureau of Labor Statistics)

	Nov. 16 1954	Nov. 9 1954	Month Ago	Oct. Average
(1947-1949=100)	144.7	144.7	144.7	144.7

AVERAGE PRICES OF STEEL (Bureau of Labor Statistics)

Week Ended Nov. 16

Prices include mill base prices and typical extras and deductions. Units are 100 lb except where otherwise noted in parentheses. For complete description of the following products and extras and deductions applicable to them write to STEEL.

Rails, standard, No. 1	$4.525	Sheets, electrical	$9.350
Rails, light, 40 lb	5.917	Strip, C.R., carbon	7.507
Tie Plates	5.275	Strip, C.R., stainless, 430 (lb)	0.415
Axles, railway	7.500	Strip, H.R., carbon	5.125
Wheels, freight car, 33 in. (per wheel)	48.500	Pipe, black, buttweld (100 ft)	15.000
Plates, carbon	4.675	Pipe, galv., buttweld (100 ft)	18.605
Structural Shapes	4.517	Pipe, line (100 ft)	146.804
Bars, tool steel, carbon (lb)	0.430	Casing, oil well, carbon (100 ft)	154.216
Bars, tool steel, alloy, oil hardening die (lb)	0.525	Casing, oil well, alloy (100 ft)	227.875
Bars, tool steel, H.R., alloy, high speed W 6.75, Cr 4.5, V 2.1, Mo 5.5, C 0.60 (lb)	1.115	Tubes, boiler (100 ft)	‡
Bars, tool steel, H.R., alloy, high speed W 18, Cr 4, V 1 (lb)	1.610	Tubing, mechanical, carbon	‡
Bars, H.R., alloy	8.775	Tubing, mechanical, stainless, 304 (100 ft)	161.193
Bars, H.R., stainless, 303 (lb)	0.418	Tin plate, hot-dipped, 1.25 lb	8.533
Bars, H.R., carbon	5.000	Tin plate, electrolytic, 0.25 lb	7.233
Bars, reinforcing	5.050	Black plate, can making quality	6.333
Bars, C.F., carbon	8.160	Wire, drawn, carbon	7.938
Bars, C.F., alloy	11.275	Wire, drawn, stainless, 430 (lb)	0.545
Bars, C.F., stainless, 302 (lb)	0.433	Bale ties (bundle)	5.860
Sheets, H.R., carbon	4.880	Nails, wire, 8d common	7.815
Sheets, C.R., carbon	5.871	Wire, barbed (80-rod spool)	7.109
Sheets, galvanized	7.220	Woven wire fence (20-rod roll)	16.815
Sheets, C.R., stainless, 302 (lb)	0.548		

‡Not available.

STEEL's FINISHED STEEL PRICE INDEX*

	Nov. 17 1954	Week Ago	Month Ago	Year Ago	5 Yrs. Ago
Index (1935-39 av.=100)	194.53	194.53	194.53	189.38	152.52
Index in cents per lb.	5.270	5.270	5.270	5.130	4.132

STEEL's ARITHMETICAL PRICE COMPOSITES

Finished Steel, NT*	$117.95	$117.95	$117.95	$115.18	$91.64
No. 2 Fdry, Pig Iron, GT	56.54	56.54	56.54	56.54	46.10
Basic Pig Iron, GT	56.04	56.04	56.04	56.04	45.60
Malleable Pig Iron, GT	57.27	57.27	57.27	57.27	47.27
Steelmaking Scrap, GT	33.67	33.67	32.33	35.00	30.00

*For explanation of weighted index see STEEL, Sept. 19, 1949, p. 54; of arithmetical price composite, STEEL, Sept. 1, 1952, p. 130.

Comparison of Prices

Comparative prices by districts, in cents per pound except as otherwise noted. Delivered prices based on nearest production point.

FINISHED STEEL	Nov. 17 1954	Week Ago	Month Ago	Year Ago	5 Yrs. Ago
Bars, H.R., Pittsburgh	4.30	4.30	4.30	4.15	3.35
Bars, H.R., Chicago	4.30	4.30	4.30	4.15	3.35
Bars, H.R., deld. Philadelphia	4.55	4.55	4.55	5.302	3.83
Bars, C.F., Pittsburgh	5.40	5.40	5.40	5.20	3.95-4.00
Shapes, Std., Pittsburgh	4.25	4.25	4.25	4.10	3.25
Shapes, Std., Chicago	4.25	4.25	4.25	4.10	3.25
Shapes, deld., Philadelphia	4.53	4.53	4.53	4.38	3.50
Plates, Pittsburgh	4.225	4.225	4.225	4.10	3.40
Plates, Chicago	4.225	4.225	4.225	4.10	3.40
Plates, Coatesville, Pa.	4.225	4.225	4.225	4.35	3.50
Plates, Sparrows Point, Md.	4.225	4.225	4.225	4.10	3.40
Plates, Claymont, Del.	4.225	4.225	4.225	4.55	3.50
Sheets, H.R., Pittsburgh	4.05	4.05	4.05	3.925	3.25
Sheets, H.R., Chicago	4.05	4.05	4.05	3.925	3.25
Sheets, C.R., Pittsburgh	4.95	4.95	4.95	4.775	4.00
Sheets, C.R., Chicago	4.95	4.95	4.95	4.775	4.00
Sheets, C.R., Detroit	5.10	5.10	5.10	4.975	4.20
Sheets, Galv., Pittsburgh	5.45	5.45	5.45	5.275	4.40
Strip, H.R., Pitts.	4.05	4.05	4.05	4.025	3.25
Strip, H.R., Chicago	4.05	4.05	4.05	3.925	3.25
Strip, C.R., Pittsburgh	5.75	5.75	5.75	5.45-5.95	4.00
Strip, C.R., Chicago	5.85	5.85	5.85	5.70	4.00-4.15
Strip, C.R., Detroit	5.60-.90	5.60-.90	5.60-.90	5.45-6.05	4.20-.25
Wire, Basic, Pitts.	5.75	5.75	5.75	5.475-5.525	4.15
Nails, Wire, Pittsburgh	6.85	6.85	6.85	6.35-6.55	5.15
Tin plate (1.50 lb), box, Pitts.	$9.05	$9.05	$9.05	$8.95	$7.75

SEMIFINISHED STEEL					
Billets, forging, Pitts. (NT)	$78.00	$78.00	$78.00	$75.50	$61.00
Wire rods, ⅜-⅝" Pitts.	4.675	4.675	4.675	4.525	3.40

PIG IRON, Gross Ton					
Bessemer, Pitts.	$57.00	$57.00	$57.00	$57.00	$47.00
Basic, Valley	56.00	56.00	56.00	56.00	46.00
Basic, deld. Phila.	59.66	59.66	59.66	60.75	49.44
No. 2 Fdry, Pitts.	56.60	56.50	56.50	56.50	46.50
No. 2 Fdry, Chicago	56.50	56.50	56.50	56.50	46.50
No. 2 Fdry, Valley	56.50	56.50	56.50	56.50	46.50
No. 2 Fdry, deld. Phila.	50.16	50.16	50.16	61.25	49.94
No. 2 Fdry, Birm.	52.88	52.88	52.88	52.88	39.38
No. 2 Fdry (Birm.) deld. Cin.	60.58	60.58	60.58	60.43	46.08
Malleable, Valley	56.50	56.50	56.50	56.50	46.50
Malleable, Chicago	56.50	56.50	56.50	56.50	46.50
Ferromanganese, Duquesne.	190.00†	190.00†	190.00†	200.00†	175.00*

*75-82% Mn, gross ton, Etna, Pa. †74-76% Mn, net ton.

SCRAP, Gross Ton (Including broker's commission)					
No. 1 Heavy Melt, Pitts.	$34.50	$34.50	$32.50	$36.50	$33.00
No. 1 Heavy Melt, E. Pa.	33.50	33.50	31.50	35.00	26.50
No. 1 Heavy Melt, Chicago	33.00	33.00	33.00	33.50	30.50
No. 1 Heavy Melt, Valley	34.50	35.50	35.00	35.50	32.75
No. 1 Heavy Melt, Cleve.	32.50	33.50	32.00	33.50	30.25
No. 1 Heavy Melt, Buffalo	32.50	31.50	30.50	34.50	29.75
Rails, Rerolling, Chicago	54.50	54.50	56.00	46.50	39.50
No. 1 Cast, Chicago	39.50	39.50	39.50	34.50	42.50

COKE, Net Ton					
Beehive, Furn, Connlsvl.	$13.75	$13.75	$13.75	$14.75	$13.25
Beehive, Fdry, Connlsvl.	16.75	16.75	16.75	16.75	15.75
Oven Fdry, Chicago	24.50	24.50	24.50	24.50	20.00

Daily Nonferrous Price Record

	Price Nov. 17	Last Change	Previous Price	Oct. Avg.	Sept. Avg.	Nov. 1953 Avg.
Copper	30.00	Apr. 12	29.75-30.00	30.000	30.000	29.606
Lead	14.80	Oct. 4	14.55	14.775	14.400	13.300
Zinc	11.50	Sept. 3	11.00	11.500	11.900	10.000
Tin	92.25	Nov. 17	91.50	93.110	93.545	81.096
Nickel	60.00	Jan. 14, 1953	56.50	60.000	60.000	60.000
Aluminum	22.20	Aug. 5, 1954	21.50	22.200	22.200	21.500
Magnesium	27.00	Mar. 9, 1953	24.50	27.000	27.000	27.000

Quotations in cents per pound based on: Copper, deld. Conn. Valley; Lead, commond grade, deld. St. Louis; Zinc, prime western, E. St. Louis; Tin, Straits, deld. New York; Nickel, electrolytic cathodes, 99.9%, base size at refinery unpacked; Aluminum, primary ingots, 99+ %, deld.; Magnesium 99.8%, Freeport, Tex.

What You Can Use the Markets Section for:

- **A source of price information.**
  Current prices are reported each week. Price changes are shown in italics. Price trends are shown in tables of indexes and comparisons.
- **A directory of producing points.**
  Want to know who makes something, or where it is made? The steel price tables alphabetically list the cities of production and indicate the producing company. If you are a buyer, you may want to make a map showing comparative distances of sources of supply and to help you compute freight costs. If you are a seller of supplies you can make a map to spot your sales possibilities.
- **A source of price data for making your own comparisons.**
  Maybe you want to keep a continuous record of price spread between various forms of steel. You can get your base price information from STEEL's price tables.
- **A source of information on market trends.**
  Newsy items tell you about the supply-demand situation of materials, including iron and steel, nonferrous metals and scrap. Other articles analyze special situations of interest and importance to you.
- **Reports on iron and steel production, and materials and product shipments.**

What happens to the transmission when horsepower goes up?

Harley-Davidson faced the problem when it increased horsepower from 30 to 55. In a motorcycle, it usually means a bigger transmission. More steel. Maybe more parts. And more expense.

Company engineers, with the help of Republic metallurgists, took a good look at alloy steels. They chose Republic's 8617 for a lot of reasons. One of them was the reduction of section possible. Another was the good heat-treating and carburizing properties. Still another, it stood up well under the heavy strain of gear teeth.

And, most important, the transmission could stay the same size and still take tremendous impact and stress.

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REPUBLIC ALLOY STEELS

Nonferrous Metals

Russia may outstrip United States in magnesium output next year. Soviets will produce half the world's supply by 1956, if trends continue

Nonferrous Metal Prices, Pages 136 & 137

RUSSIAN magnesium production, increasing spectacularly since 1948, may outstrip U. S. output next year. If trends (the U. S. decline and Russian rise) continue, the U.S.S.R. will be producing half the world's supply by 1956, J. S. Kirkpatrick, Brooks & Perkins Inc., revealed at the Magnesium Association's tenth annual meeting last week in St. Louis.

Campaign in 1953—Russian magnesium output hit 50,000 tons, and it should reach 55,000 tons this year. In the 1944-1948 period, average annual turnout was only 15,800 tons. U. S. production has receded from annual peaks of nearly 200,000 tons during World War II and a Korea-inspired 105,821 tons in 1952 to about 75,000 tons expected this year. A turnout of less than 60,000 tons is anticipated in 1955. Revelation of the Russian gains was made to dramatize the need for maintaining or increasing present production levels.

Dow Chemical Co. and the government are squabbling over Dow's bid to buy the government-owned Velasco, Tex., primary magnesium plant. The deal, favored and approved by General Services Administration, ran into a Justice department veto based on a possible antitrust violation. Dow is operating the plant, dependent on the company's adjoining Freeport operation, on a three-month contract extension.

Support—Magnesium industry men are supporting Dow's stand. They would like to see another producer in the field, but there is no logical contender, leaving Dow in the uneasy position of an unwilling monopoly. To close Velasco would threaten defense needs, say magnesium men; the metal is used extensively in aircraft, guided missiles and airborne military equipment. Requirements for wrought and cast products and for alloying aluminum (which today would use 45 to 60 per cent of Freeport's capacity alone) are greater than the plant's capacity.

Away from Defense—Essentially dependent on the military as its best customer, the magnesium industry is pushing its way into civilian fields slowly. A couple of years ago about 80 per cent of magnesium uses were for military equipment. Today, it's down to about 65 per cent, with 45 per cent of sheet, 50 per cent of extrusions and 70 per cent of die castings going to civilian markets. Decline in defense and the general economic settling have caused magnesium sales volume to trail off about 20 per cent in 1954, but a comeback in '55 is confidently predicted. Finalizing of design on new military items and projects like B-52 production will help. So will increased use in household appliances, portable tools and office machines (the new Sound-Scriber uses 23 magnesium die castings).

The Future—Today, some 90 companies fabricate and sell magnesium to numerous end-use fabricators and assemblers. Orders for sheet and plate are extended, as Dow's big Madison, Ill., plant hasn't yet reached capacity. Open foundry capacity is common; about 85 per cent of magnesium sand castings go into defense uses. Magnesium men are trying to overcome it by selling fine tolerance and close finish; they are experimenting with zirconium-thorium rare earth alloys to compete with other metals in high temperature applications without impregnation. New processes such as impact extrusion are creating interest and being translated into additional business. Improved alloy properties, uniformity of product, better finishes and enlightenment of potential users about the few handling hazards encountered are seen as keys to further advances. Competitive inventiveness will push magnesium into new applications, association members were told.

Among the products on display to exemplify this keynote: Experimental thin-wall impact extrusions, including a cylinder measuring 3 in. wide x 27 in. long; an air foil section with cast surface 200 micro-inches or less; die cast vacuum cleaner parts which minimize starting inertia and vibration; shell molded tank vent fittings; impact-extruded missile body and support ring produced as an integral unit; die cast camera and field glasses housings; a field telephone carrying case deep drawn with 20 to 1 depth-to-corner radii ratio.

New Machine—Development of a successful hot chamber die casting process for magnesium was revealed at the meeting. It will be licensed on a nonroyalty basis to encourage magnesium use. Dow Chemical Co., developer of the process, believes it will make magnesium die castings "competitive with aluminum and zinc." The present machine uses alloys in the 6 to 11 per cent aluminum range and turns out castings up to 2 lb. Melt loss is said to be 12 per cent, compared with 20 per cent on cold chamber magnesium machines. Casting pressure is 3000 psi, same as with hot chamber zinc process, and casting temperature is 1180° F for 90 per cent of the work run.

Magnesium: Seven Years of Shipments

Net Tons

	Primary Ingot	Sand Castings	Die Castings	Permanent Mold Castings	Sheet	Extrusions	Forgings	Alloy and Other*
1954 est.	75,000	8,000	2,200	1,800	5,100	2,700	180	24,800
1953	93,112	11,584	3,057	2,658	5,243	3,000	200	20,840
1952	105,821	14,513	2,777	1,115	5,569	3,756	12	16,105
1951	40,881	10,179	994	646	5,761	5,241	735	12,154
1950	15,726	3,909	242	573	3,357	3,400	104	7,285
1949	11,598	3,088	127	44	2,155	3,364	200	2,969
1948	10,003	1,930	213	12	1,261	2,529	103	3,650

*Domestic consumption.

Campaign for Die Castings

A campaign to show how better metal components can be produced by die casting promises to boost consumption in this important exclusively nonferrous field. American Die Casting Institute will direct a new informational program at industry to acquaint design engineers and production executives with the full potentialities of the die casting process and the necessity of knowing the art involved. It will be neither a "buckshot approach to the public at large," nor "propaganda for the institute," according to David Laine, secretary. The program will feature technical meetings where commentators will encourage use of die castings only for valid applications, "urging some other production process rather than see a bad die cast product on the market."

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Nonferrous Metals

Cents per pound, carlots, except as otherwise noted

PRIMARY METALS AND ALLOYS

Aluminum: 99 + %, ingots 22.20, pigs 20.50 10,000 lb or more, f.o.b. shipping point. Freight allowed on 500 lb or more.

Aluminum Alloy: No. 13, 12% Si, 24; No. 43, 5% Si, 23.8; No. 142, 4% Cu, 25.1; No. 195, 4.5% Cu, 0.8% Si, 24.5; No. 214, 3.8% Mg, 25.2; No. 356, 7% Si, 0.3% Mg, 23.9.

Antimony: R.M.M. brand, 99.5% 28.50, Lone Star brand, 29.00, f.o.b. Laredo, Tex., in bulk. Foreign brands, 99.5%, 27.50-28.00 New York, duty paid, 10,000 lb or more.

Beryllium: 97%, lump or beads, $71.50 per lb f.o.b. Cleveland or Reading, Pa.

Beryllium Aluminum: 5% Be, $72.75 per lb of contained Be, f.o.b. Reading, Pa.; Elmore, O.

Beryllium Copper: 3.75-4.25% Be, $40.00 per lb of contained Be, with balance as Cu at market price on shipment date, f.o.b. Reading, Pa. or Elmore, O.

Bismuth: $2.25 per lb, ton lots.

Cadmium: Sticks and bars, $1.70 per lb deld.

Cobalt: 97-99%, $2.60 per lb for 550 lb keg; $2.62 per lb for 100 lb case; $2.67 per lb under 100 lb.

Columbium: Powder, $75.00 per lb, nom.

Copper: Electrolytic 30.00 deld. Conn. Valley, 30.00 deld. Midwest; Lake 30.00 deld.; Fire refined 29.75 deld.

Germanium: 99.9%, $295 per lb, nom.

Gold: U. S. Treasury, $35 per oz.

Indium: 99.9%, $2.25 per troy oz.

Iridium: $145-$150 per troy oz.

Lead: Common 14.80, chemical 14.90, corroding 14.90, St. Louis; N. Y. basis, add 0.20.

Lithium: 98%, $11-$14 per lb, depending on quantity.

Magnesium: 99.8%, self-palletizing pig 27.00; notched ingot 27.75, 10,000 lb or more, f.o.b. Freeport, Tex. For Port Newark, N. J., and Madison, Ill., add 1.20 for pig and 1.25 for ingot. Sticks 1.3 in. diameter, 46.00, 100 to 4999 lb f.o.b. Madison, Ill.

Magnesium Alloys: AZ91C and alloys C, H, G and R 32.50; alloy M 34.50, 10,000 lb or more f.o.b. Freeport, Tex., or Madison, Ill. Add 1.20 for Port Newark, N. J.

Mercury: Open market, spot, New York, $320-$325, per 76-lb flask.

Molybdenum: Powder 99% hydrogen reduced $3.40 per lb; pressed ingot $4.06 per lb; sintered ingot $5.53 per lb.

Nickel: Electrolytic cathodes, sheets (4 x 4 in. and larger), unpacked 60.00; 25-lb pigs 62.65; "XX" nickel shot 63.65; "F" nickel shot or ingots for addition to cast iron, 60.00; prices f.o.b. Port Colborne, Ont., including import duty, New York basis, add 0.92.

Osmium: $140-$150 per troy oz nom.

Palladium: $21 per troy oz.

Platinum: $84-$87 per troy oz from refineries.

Radium: $16-$21.50 per mg radium content, depending on quantity.

Rhodium: $125 per troy oz.

Ruthenium: $75-$80 per troy oz.

Selenium: 99.5%, $5-$6 per lb.

Sodium: 16.50, carlots; 17.00 l.c.l.

Tantalum: Sheet, rod $39.00 per lb; powder $33.50 per lb.

Tellurium: $1.75 per lb.

Thallium: $12.50 per lb.

Tin: Straits, N. Y., spot 92.25, prompt 92.25.

Titanium: Sponge, 99.3+%, grade A-1 ductile (0.3% Fe max) $4.72; grade A-2 (0.5% Fe max) $4.46 per pound.

Tungsten: Powder, 98.8%, carbon reduced, 1000 lb lots $4.95 per lb, f.o.b. shipping point; less than 1000 lb $5.10 99+% hydrogen reduced, $4.65. Treated ingots $6.70.

Zinc: Prime Western 11.50, brass special 11.75, intermediate 12.00, E. St. Louis, freight allowed over 0.50 per pound. High grade 12.85, special high grade 13.00, die casting alloy ingot 15.50, deld.

Zirconium: Sponge $10 per lb; powder electronics grade $15, flash grade $11.50.

(Note: Chromium, manganese and silicon metals are listed in ferroalloy section.)

SECONDARY METALS AND ALLOYS

Aluminum Ingot: Piston alloy 21.25-21.75; No. 12 foundry alloy (No. 2 grade) 20.25-20.75; 5% silicon alloy, 0.60 Cu max., 23.75-24.00; 13 alloy 0.60 Cu max., 23.75-24.00; 195 alloy 21.75-22.75; 108 alloy 20.75-21.25; steel deoxidizing grades, notch bars, granulated or shot: Grade 1, 21.50-22.00; grade 2, 20.50-21.00; grade 3, 19.50-20.00; grade 4, 18.50-19.00.

Brass Ingot: Red brass, No. 115, 29.50; tin bronze No. 225, 41.00; No. 245, 34.75; high-leaded tin bronze, No. 305, 34.00; No. 1 yellow, No. 405, 25.25; manganese bronze No. 421, 27.75

Magnesium Alloy Ingot: AZ63A, 31.50; AZ91B, 26.00; AZ91C, 31.50; AZ92A, 31.50.

NONFERROUS MILL PRODUCTS

BERYLLIUM COPPER

(Base prices per lb, plus mill extras 2000 to 5000 lb, f.o.b. Temple, Pa.; nominal 1.9% Be alloy.) Strip, $1.68; rod, bar, wire, $1.65.

COPPER WIRE

Bare, soft, f.o.b. eastern mills, 100,000 lb lots, 35.36; 30,000 lb lots, 35.48; l.c.l. 35.98. Weatherproof, 100,000 lb, 36.28; 30,000 lb. 36.53; l.c.l. 37.03. Magnet wire deld., 15,000 lb or more 41.83; l.c.l 42.58.

LEAD

(Prices to jobbers f.o.b. Buffalo, Cleveland, Pittsburgh.) Sheets, full rolls, 140 sq ft or more $20.00 per cwt; pipe, full coils $20.00 per cwt; traps and bends, list prices plus 30%.

TITANIUM

(Prices per lb, 10,000 lb and over, f.o.b. mill) Sheets, $15; sheared mill plate, $12; strip, $15; wire, $11; forging billets $6; hot-rolled and forged bars, $6.

ZINC

(Prices per lb c.l.., f.o.b. mill) Sheets 23.00, ribbon zinc in coils, 18.50-20.50; plates 18.00-22.25.

ZIRCONIUM

Plate $27; H.R. strip $28; C.R. strip $35; forged or H.R. bars $27; wire, 0.015 in., 1 cent per linear foot.

NICKEL, MONEL, INCONEL

	"A" Nickel	Monel	Inconel
Sheet, C.R.	86.5	67.5	92.5
Strip, C.R.	92.5	70.5	98.5
Plate, H.R.	84.5	66.5	90.5
Rod, Shapes	82.5	65.5	88.5
Seamless Tubes	115.5	100.5	137.5
Shot, Blocks		60.0	

ALUMINUM*

Screw Machine Stock: 5000 lb and over.

Dia. (in.) or across flats	Round 2011-T3	Round 2017-T4	Hexagonal 2011-T3	Hexagonal 2017-T4
Drawn				
0.125	62.5	61.0	...	...
0.156-0.172	52.9	51.3	...	...
0.188	52.9	51.3	...	65.8
0.219-0.234	50.1	48.5	...	...
0.250-0.281	50.1	48.5	...	62.7
0.313	50.1	48.5	...	59.8
Cold-finished				
0.375-0.547	48.9	46.5	58.8	56.2
0.563-0.688	48.9	46.5	55.9	52.7
0.750-1.000	47.7	45.3	51.1	49.6
1.063	47.7	45.3	...	47.9
1.125-1.500	45.9	43.6	49.4	47.9
Rolled				
1.563	44.7	42.4	...	...
1.625-2.000	44.1	41.8	...	46.2
2.125-2.500	43.0	40.7	...	...
2.563-3.375	41.7	39.5	...	...

ALUMINUM*

Sheets and Circles: 1100 and 3003 mill finish c.l. (30,000 lb base; freight allowed over 499 lb)

Thickness Range Inches	Widths or Diameters, In., Inc.	Flat Sheet*	Coiled Sheet	Coiled Sheet Circle†
0.249-0.136	12-49	34.9	...	...
0.135-0.096	12-48	35.4	...	...
0.095-0.077	12-48	36.1	33.6	38.6
0.076-0.061	12-48	36.7	33.8	38.8
0.060-0.048	12-48	37.2	34.1	39.2
0.047-0.038	12-48	37.7	34.6	39.6
0.037-0.030	12-48	38.1	35.0	40.3
0.029-0.024	12-48	38.7	35.3	40.8
0.023-0.019	12-36	39.4	36.1	41.6
0.018-0.017	12-36	40.2	36.7	42.5
0.016-0.015	12-36	41.1	37.5	43.7
0.014	12-24	42.1	38.5	45.0
0.013-0.012	12-24	43.3	39.2	46.0
0.011	12-24	44.3	40.4	47.6
0.010-0.0095	12-24	45.5	41.5	49.2
0.009-0.0085	12-24	46.8	43.0	51.3
0.008-0.0075	12-24	48.4	44.2	53.1
0.007	12-18	49.9	45.7	55.4
0.006	12-18	51.5	47.1	60.4

*72-180 in. lengths. †26 in. max. dia.

ALUMINUM*

Plates and Circles: Thickness 0.250-3.0 in. 24-60 in. width or dia, 72-240 in. lengths.

Alloy	Plate Base	Circle Base
1100-F, 3003-F	34.7	38.9
5050-F	34.7	38.9
3004-F	35.7	40.6
5052-F	37.4	42.4
6061-T6	38.6	43.0
2024-T4*	40.8	46.9
7075-T6*	48.6	55.2

*24-48 in. widths or dia., 72-180 in. lengths.

ALUMINUM*

Forging Stock: Round, Class 1, 46.8-36.3, in specific lengths 36-144 in., diameters 0.375-8 in. Rectangles and squares, Class 1, 52.6-40 in. random lengths 0.375-4.0 in. thick, widths 0.750-10.0 in.

Pipe: A.S.A. Schedule 40, alloy 6063-T6, 20 ft length, plain ends, 90,000 lb base, per 100 ft.

Nom. pipe size, in.		Nom. pipe size, in.	
¾	$515.70	2	$ 48.30
1	24.75	4	132.90
1¼	23.50	6	238.35
1½	40.05	8	358.60

*Alloy designations are standard for use on and after Oct. 1, 1954. To relate them to designations used prior to that time, see STEEL, Aug. 9, 1954, p. 95.

MAGNESIUM

Sheet: AZ31, commercial grade, 0.032-in. 94.00, 0.064-in. 73.00, 0.125-in. 60.00, 30,000 lb and over, f.o.b. mill.

Plate: Hot rolled AZ31, 53.00, 20,000 lb or more 0.250-in. and over widths to 48 in., lengths to 144 in.; raised pattern floor plate, 59.00, 20,000 lb or more, ¼-in. thick, widths 24-72 in., lengths 60-192 in.

Extrusion Stock: AZ31, Rectangles, ¼ x 2 in. 69.20, 1 x 4 in. 63.00. Rod, 1 in. 66.00, 2 in. 62.50. Tubing, 1 in. OD x 0.065-in. 87.00. Angles, 1 x 1 x ⅛-in. 72.90, 2 x 2 x ¼-in. 67.00. Channels, 5 in. 67.80. I-Beams, 5 in. 66.20.

NONFERROUS SCRAP

DEALERS' BUYING PRICES

(Cents per pound, New York, in ton lots)

Aluminum: 2S clippings 14.50; low copper clippings 14.50; mixed clippings 12.50; old sheet 11.00; borings and turnings 7.50; pistons and struts 8.00; crankcases 11.00; industrial castings 11.00.

BRASS MILL PRICES

	MILL PRODUCTS a				SCRAP ALLOWANCES f		
	Sheet, Strip, Plate	Rod	Wire	Steamless Tube	Clean Heavy	Rod Ends	Clean Turnings
Copper	48.38b	45.98c	....	48.44	26.000	26.000	25.250
Yellow Brass	41.72	34.50d	42.26	44.63	19.750	19.500	18.000
Red Brass, 85%	45.44	45.38	45.98	48.25	23.000	22.750	22.250
Low Brass, 80%	44.47	44.41	45.01	47.28	22.125	21.875	21.375
Naval Brass	45.76	40.07	52.80	48.92	18.250	18.000	17.500
Commercial Bronze, 90%	46.95	46.89	47.49	49.51	23.875	23.625	23.125
Nickel Silver, 10%	55.36	59.43g	57.69	....	23.625	23.375	11.813
Phosphor Bronze, A, 5%	66.58	67.08	67.08	68.23	26.125	25.875	24.875
Silicon Bronze	52.71	51.90	52.75	70.11e	25.125	24.875	24.125
Manganese Bronze	49.48	43.62	54.06	....	18.250	18.000	17.500
Muntz Metal	43.96	39.77	....	....	18.625	18.375	17.875

a. Cents per lb f.o.b. mill; freight allowed on 500 lb or more. b. Hot-rolled. c. Cold-drawn. d. Free cutting. e. 3% silicon. f. Prices in cents per lb for less than 20,000 pounds, f.o.b. shipping point. On lots over 20,000 lb at one time, of any or all kinds of scrap, add 1 cent per lb. g. Leaded.

Copper and Brass: Heavy copper and wire, No. 1 25.50; No. 2 copper 24.50; light copper 22.50; No. 1 composition red brass 20.00; No. 1 composition turnings 19.50; mixed brass turnings 14.00; new brass clippings 18.00; No. 1 brass rod turnings 15.00; light brass 12.50; heavy yellow brass 15.50; new brass rod ends 16.00; auto radiators, unsweated 17.00; cocks and faucets 17.00; brass pipe 17.50.

Lead: Heavy 11.75-12.00; battery plate 6.25-6.50; linotype and stereotype 13.75-14.00; electrotype 12.00-12.50; mixed babbitt 12.50-13.00.

Magnesium: Clippings 18.50-19.50; clean castings 17.50-18.50; iron castings, not over 10% removable Fe, 16.50-17.50.

Monel: Clippings 23.00-25.00; old sheet 21.00-23.00; turnings 16.00-18.00; rods 23.00-25.00.

Nickel: Sheets and clips 60.00-65.00; rolled anodes 60.00-65.00; turnings 40.00; rod ends 60.00-65.00.

Tin: No. 1 pewter 55.00-60.00; block tin pipe 75.00-80.00; No. 1 babbitt 50.00.

Zinc: Old zinc, 5.00-5.25; new die cast scrap, 4.75-5.00; old die cast scrap, 3.25-3.50.

REFINER'S BUYING PRICES

(Cents per pound, carlots, delivered refinery)

Aluminum: 2S, 3S clippings 16.00-16.25; 51S, 52S clippings 16.00-16.25; 14S, 17S, 24S clippings 15.25-15.50; mixed clippings 14.75-15.00; old sheet 14.00-14.25; old cast 14.00-14.25; clean old cable, free of steel 16.00-16.25; borings and turnings 14.25-14.75.

Beryllium Copper: Heavy scrap, 0.020-in. and heavier, not less than 1.5% Be, 42.00; light scrap 37.00.

Copper, Brass: No. 1 copper 28.50; No. 2 copper 27.00; light copper 25.50; refinery brass (60% copper) per dry copper content 25.00.

INGOTMAKERS' BUYING PRICES

(Cents per pound, carlots, delivered)

Copper, Brass: No. 1 copper 27.75; No. 2 copper 26.25; light copper 24.75; No. 1 composition borings 22.75; No. 1 composition solids 23.00; heavy yellow brass solids 18.00; yellow brass turnings 17.00; radiators 18.75.

PLATING MATERIALS

(F.o.b. shipping point, freight allowed on quantities)

ANODES

Cadmium: Special or patented shapes $1.70 per lb.

Copper: Flat-rolled 45.04, oval 44.54, 5000-10,000 lb; electrodeposited 39.78, cast 42.04, 2000-5000 lb lots.

Nickel: Depolarized, less than 500 lb 92.00; 500-4999 lb 88.00; over 5000 lb 86.00.

Tin: Bar or slab, less than 200 lb $1.05; 200-499 lb $1.09; 500-999 lb $1.085; 1000 lb or more $1.08.

Zinc: Bar 20.00, bar or flat top 19.00 ton lots.

CHEMICALS

Cadmium Oxide: $2.15 per lb, in 100 lb drums.

Chromic Acid: Less than 10,000 lb 28.50; over 10,000 lb 27.50.

Copper Cyanide: Under 1000 lb 63.90, 1000 lb and over 61.90.

Copper Sulphate: 100-6000 lb 11.35; 6000-12,000 lb 11.10; 12,000-24,000 lb 10.85; 24,000-36,000 lb 10.60; 36,000 lb and over 10.35.

Nickel Chloride: 100 lb 45.00; 200 lb 43.00; 300 lb 42.00; 400-4900 lb 40.00; 5000-9900 lb 38.00; 10,000 lb and over 37.00.

Nickel Sulphate: 100 lb 37.00; 200 lb 35.00; 300 lb 34.00; 400-4900 lb 32.00; 5000-35,000 lb 30.00; 36,000 lb and over 29.00.

Silver Cyanide: Cents per ounce, 16 oz 80.625; 100 oz 78.50; 25,000 oz and over 77.325.

Sodium Cyanide: Egg, under 1000 lb 19.80; 1000-19,900 lb 18.80; 20,000 lb and over 17.80; granular, add 1-cent premium to above.

Sodium Stannate: Less than 100 lb 70.6; 100-600 lb 56.3; 700-1900 lb 53.9; 2000-9900 lb 52.1; 10,000 lb or more 51.

Stannous Chloride (Anhydrous): Less than 50 lb $1.564; 50 lb $1.224; 100-300 lb $1.074; 400-900 lb $1.049; 100-1900 lb $1.025; 2000-4900 lb 98.8; 5000-19,000 lb 92.7; 20,000 lb and over 86.6.

Stannous Sulphate: Less than 5 lb $1.264; 50 lb 96.4; 100-1900 lb 94.4; 2000 lb and over 92.4.

Zinc Cyanide: Under 1000 lb 54.30; 1000 lb and over 52.30.

(Advertisement)

If miniaturization is a problem BERYLLIUM COPPER MAY SOLVE IT

THE PROBLEM. Aware of the trend to smaller, lighter products, Edison engineers set out to create the V.P. Voicewriter—a personal dictating machine compact enough for carrying in a brief case, yet sturdy enough to match the performance of larger units. Several of the V.P.'s vital parts presented a serious problem of material selection. Besides meeting the over-all objective of space saving, these parts would be required to have a variety of special properties to facilitate assembly and to maintain Edison's high standards for service-free performance.

THE SOLUTION. Thanks to high strength, versatile Berylco beryllium copper, these critical components do a big job, take up little room in the production model of the V.P. Berylco provided every required feature—both space and performance requirements—in more than adequate measure. And the V.P. was easier to assemble because several of the Berylco parts could be highly stressed without damage.

PERFORMANCE PLUS. Edison selected Berylco beryllium copper not for one valuable property, but many. Conductivity, hardness, stress resistance, wear resistance, nonmagnetic qualities, spring qualities, ability to be fixture heat treated without loss of elasticity—every one was important. In all these requirements Berylco delivers performance *plus*. That's why it has enabled manufacturers of such diverse things as bearings, precision switches, controls and machine tools to make smaller, lighter, more efficient products. Berylco can help you, too. For sample material or engineering assistance, write THE BERYLLIUM CORPORATION, Dept.4-K, Reading 19, Pa.

Tomorrow's products are planned today—with Berylco beryllium copper

Steel Prices

Mill prices as reported to STEEL, cents per pound except as otherwise noted. Changes shown in italics. Code numbers following mill points indicate producing company; key on page 139. Key to footnotes, page 141.

SEMIFINISHED

INGOTS, Carbon, Forging (NT)
Munhall,Pa. U5 .....$61.50

INGOTS, Alloy (NT)
Detroit R7 .....$65.00
Houston S5 .....73.00
Midland,Pa. C18 .....65.00
Munhall,Pa. U5 .....65.00

BILLETS, BLOOMS & SLABS Carbon, Rerolling (NT)
Aliquippa,Pa. J5 ....$64.00
Bessemer,Pa. U5 .....64.00
Buffalo R2 .....64.00
Clairton,Pa. U5 .....64.00
Ensley,Ala. T2 .....64.00
Fairfield,Ala. T2 .....64.00
Fontana,Calif. K1 ....72.00
Gary,Ind. U5 .....64.00
Johnstown,Pa. B2 .....64.00
Lackawanna,N.Y. B2 ..64.00
Munhall,Pa. U5 .....64.00
So.Chicago,Ill. R2,U5 ..64.00
So.Duquesne,Pa. U5 ...64.00
Youngstown R2 .....64.00

Carbon, Forging (NT)
Aliquippa,Pa. J5 .....$78.00
Bessemer,Pa. U5 .....78.00
Buffalo R2 .....78.00
Canton,O. R2 .....80.00
Clairton,Pa. U5 .....78.00
Conshohocken,Pa. A3 ..83.00
Ensley,Ala. T2 .....78.00
Fairfield,Ala. T2 .....78.00
Fontana,Calif. K1 ....86.00
Gary,Ind. U5 .....78.00
Geneva,Utah C11 ....78.00
Houston S5 .....85.00
Johnstown,Pa. B2 ....78.00
Lackawanna,N.Y. B2 ..78.00
LosAngeles B3 .....87.50
Munhall,Pa. U5 .....78.00
Seattle B3 .....91.50
So.Chicago R2,U5,W14.78.00
So.Duquesne,Pa. U5 ...78.00
So.SanFrancisco B3 ...87.50

Alloy, Forging (NT)
Bethlehem,Pa. B2 .....$86.00
Buffalo R2 .....86.00
Canton,O. R2, T7 ....86.00
Conshohocken,Pa. A3 ..93.00
Detroit R7 .....86.00
Fontana,Calif. K1 ....105.00
Gary,Ind. U5 .....86.00
Houston S5 .....93.00
Ind.Harbor,Ind. Y1 ...86.00
Johnstown,Pa. B2 ....86.00
Lackawanna,N.Y. B2 ..86.00
LosAngeles B3 .....106.00
Massillon,O. R2 .....86.00
Midland,Pa. C18 .....86.00
Munhall,Pa. U5 .....86.00
So.Chicago, R2,U5,W14.86.00
So.Duquesne,Pa. U5 ...86.00
Struthers,O. Y1 .....86.00
Warren,O. C17 .....86.00

ROUNDS, SEAMLESS TUBE (NT)
Buffalo R2 .....$96.50
Canton,O. R2 .....96.50
Cleveland R2 .....96.50
Gary,Ind. U5 .....96.50
So.Chicago R2, W14 ..96.50
So.Duquesne,Pa. U5 ...96.50

SKELP
Aliquippa,Pa. J5 .....4.00
Fontana,Calif. K1 .....4.775
Munhall,Pa. U5 .....3.90
Warren,O. R2 .....3.90
Youngstown R2, U5 ....3.90

WIRE RODS
AlabamaCity,Ala. R2 ..4.675
Aliquippa,Pa. J5 .....4.675
Alton,Ill. L1 .....4.85
Buffalo B11, W12 ....4.675
Cleveland A7 .....4.675
Donora,Pa. A7 .....4.675
Fairfield,Ala. T2 .....4.675
Fontana,Calif. K1 ....5.475
Houston S5 .....5.075
IndianaHarbor,Ind. Y1 .4.675
Johnstown,Pa. B2 ....4.675
Joliet,Ill. A7 .....4.675
KansasCity,Mo. S5 ....5.015
Kokomo,Ind. C18 .....4.775
LosAngeles B3 .....5.475
Minnequa,Colo. C10 ...4.925
Monessen,Pa. P7 .....4.675
No.Tonawanda,N.Y.B11 4.675
Pittsburg,Calif. C11 ..5.325
Portsmouth P12 .....4.675
Roebling,N.J. R5 .....4.775
So.Chicago,Ill. R2 ....4.675
Sterling,Ill. (1) N15 ....4.675
Sterling,Ill. N15 .....4.775
Struthers,O. Y1 .....4.675
SparrowsPoint,Md. B2..4.775
Torrance,Calif. C11 ...5.475
Worcester,Mass. A7 ...4.975

STRUCTURALS

Carbon Steel Stand. Shapes
Ala.City,Ala. R2 .....4.25
Aliquippa,Pa. J5 .....4.25
Bessemer,Ala. T2 .....4.25
Bethlehem,Pa. B2 .....4.30
Birmingham C15 .....4.25
Clairton,Pa. U5 .....4.25
Fairfield,Ala. T2 .....4.25
Fontana,Calif. K1 .....4.90
Gary,Ind. U5 .....4.25
Geneva,Utah C11 .....4.25
Houston S5 .....4.65
Ind.Harbor,Ind I-2 ....4.25
Johnstown,Pa. B2 .....4.30
KansasCity,Mo. S5 ....4.85
Lackawanna,N.Y. B2...4.30
LosAngeles B3 .....4.95
Minnequa,Colo. C10 ....4.70
Munhall,Pa. U5 .....4.25
Niles,Calif. P1 .....4.80
Phoenixville,Pa. P4 ....3.95
Portland,Oreg. O4 .....5.00
Seattle B3 .....5.00
So.Chicago U5, W14 ....4.25
So.SanFrancisco B3 ....4.90
Torrance,Calif. C11 ....4.95
Weirton,W.Va. W6 .....4.25

Wide Flange
Bethlehem,Pa. B2 .....4.30
Clairton,Pa. U5 .....4.25
Fontana,Calif. K1 .....5.25
Lackawanna,N.Y. B2 ..4.30
Munhall,Pa. U5 .....4.25
Phoenixville,Pa. P4 ....3.95
So.Chicago,Ill. U5 ....4.25

Alloy Stand. Shapes
Clairton,Pa. U5 .....5.20
Fontana,Calif. K1 .....6.60
Gary,Ind. U5 .....5.20
Houston S5 .....5.60
Munhall,Pa. U5 .....5.20
So.Chicago,Ill. U5 .....5.20

H.S., L.A. Stand. Shapes
Aliquippa,Pa. J5 .....6.40
Bessemer,Ala. T2 .....6.40
Bethlehem,Pa. B2 .....6.45
Clairton,Pa. U5 .....6.40
Fairfield,Ala. T2 .....6.40
Fontana,Calif. K1 .....7.05
Gary,Ind. U5 .....6.40
Geneva,Utah C11 .....6.40
Houston S5 .....6.80
Ind.Harbor,Ind. I-2, Y1.6.40
Johnstown,Pa. B2 .....6.45
KansasCity,Mo. S5 ....7.00
Lackawanna,N.Y. B2 ..6.45
LosAngeles B3 .....7.10
Munhall,Pa. U5 .....6.40
Seattle B3 .....7.15
So.Chicago,Ill. U5, W14..6.40
So.SanFrancisco B3 ....7.05
Struthers,O. Y1 .....6.40

H.S., L.A. Wide Flange
Bethlehem,Pa. B2 .....6.45
Lackawanna,N.Y. B2 ..6.45
Munhall,Pa. U5 .....6.40
So.Chicago,Ill. U5 .....6.40

PILING

BEARING PILES
Munhall,Pa. U5 .....4.25
So.Chicago,Ill. U5 .....4.25

STEEL SHEET PILING
Ind.Harbor,Ind. I-2....5.075
Lackawanna,N.Y. B2 ..5.075
Munhall,Pa. U5 .....5.075
So.Chicago,Ill. U5 ....5.075

PLATES

PLATES, Carbon Steel
Ala.City,Ala. R2 .....4.225
Aliquippa,Pa. J5 .....4.225
Ashland,Ky.(15) A10 ..4.225
Bessemer,Ala. T2 .....4.225
Buffalo R2 .....4.225
Clairton,Pa. U5 .....4.225
Claymont,Del. C22 ....4.225
Cleveland J5, R2 .....4.225
Coatesville,Pa. L7 .....4.225
Conshohocken,Pa. A3 ..4.225
Ecorse,Mich G5 .....4.375
Fairfield,Ala. T2 .....4.225
Fontana,Calif.(30) K1..4.875
Gary,Ind. U5 .....4.225
Geneva,Utah C11 .....4.225
GraniteCity,Ill. G4 ....4.425
Harrisburg,Pa. C5 ....3.975
Houston S5 .....4.625
Ind.Harbor,Ind. I-2, Y1.4.225
Johnstown,Pa. B2 .....4.225
Lackawanna,N.Y. B2 ..4.225
LoneStar,Tex. L6 .....4.55
Mansfield,O. E6 .....4.225
Minnequa,Colo. C10 ...5.075
Munhall,Pa. U5 .....4.225
Newport,Ky. N9 .....4.225
Pittsburgh J5 .....4.225
Riverdale,Ill. A1 .....4.225
Seattle B3 .....5.125
Sharon,Pa. S3 .....4.225
So.Chicago,Ill. R2 .....4.225
So.Chicago,Ill. U5,W14 .4.225
SparrowsPoint,Md. B2..4.225
Steubenville,O. W10 ....4.225
Warren,O. R2 .....4.225
Weirton,W.Va. W6 .....4.225
Youngstown R2,U5,Y1 4.225

PLATES, Carbon Abras. Resist.
Fontana,Calif. K1 ....6.025
Geneva,Utah C11 .....5.375

PLATES, Wrought Iron
Economy,Pa. B14 .....9.80

PLATES, High-Strength Low-Alloy
Aliquippa,Pa. J5 .....6.45
Bessemer,Ala. T2 .....6.45
Clairton,Pa. U5 .....6.45
Cleveland J5, R2 .....6.45
Conshohocken,Pa. A3 ..6.45
Ecorse,Mich. G5 .....6.60
Fairfield,Ala. T2 .....6.45
Fontana,Calif.(30) K1 ..7.15
Gary,Ind. U5 .....6.45
Geneva,Utah C11 .....6.45
Houston S5 .....6.85
Ind.Harbor,Ind. I-2, Y1.6.45
Johnstown,Pa. B2 .....6.45
Lackawanna,N.Y. B2 ...6.45
LosAngeles B3 .....7.35
Munhall,Pa. U5 .....6.45
Pittsburgh J5 .....6.45
Seattle B3 .....7.35
Sharon,Pa. S3 .....6.45
So.Chicago,Ill. U5, W14.6.45
SparrowsPoint,Md. B2 ..6.45
Youngstown U5, Y1 ....6.45

PLATES, Alloy
Claymont,Del. C22 ....5.80
Coatesville,Pa. L7 .....5.80
Fontana,Calif.K1 .....6.45
Gary,Ind. U5 .....5.80
Houston S5 .....6.20
Johnstown,Pa. B2 .....5.80
Munhall,Pa. U5 .....5.80
Newport,Ky. N9 .....5.80
Seattle B3 .....6.70
Sharon,Pa. S3 .....5.80
So.Chicago,Ill. U5, W14.5.80
SparrowsPoint,Md. B2 ..5.80

FLOOR PLATES
Cleveland J5 .....5.275
Conshohocken,Pa. A3 ..5.275
Harrisburg,Pa. C5 ....5.15
Ind.Harbor,Ind. I-2 ...5.275
Munhall,Pa. U5 .....5.275
So.Chicago,Ill. U5 ....5.275

PLATES, Ingot Iron
Ashland c.l. (15) A10..4.475
Ashland l.c.l. (15) A10.4.975
Cleveland c.l. R2 ....4.825
Warren,O. c.l. R2 .....4.825

BARS

BARS, Hot-Rolled Carbon
Ala.City,Ala, R2 .....4.30
Aliquippa,Pa. J5 .....4.30
Alton,Ill. L1 .....4.50
Atlanta,Ga. A11 .....4.50
Bessemer,Ala. T2 .....4.30
Birmingham C15 .....4.30
Buffalo R2 .....4.30
Canton,O. R2 .....4.40
Clairton,Pa. U5 .....4.30
Cleveland R2 .....4.30
Ecorse,Mich. G5 .....4.45
Emeryville,Calif. J7 ....5.05
Fairfield,Ala. T2 .....4.30
Fairless,Pa. U5 .....4.45
Fontana,Calif. K1 .....5.00
Gary,Ind. U5 .....4.30
Houston S5 .....4.70
Ind.Harbor,Ind. I-2, Y1.4.30
Johnstown,Pa. B2 .....4.30
KansasCity,Mo. S5 ....4.90
Lackawanna,N.Y. B2 ..4.30
LosAngeles B3 .....5.00
Massillon,O. R2 .....4.40
Milton,Pa. M18 .....4.30
Minnequa,Colo. C10 ...4.75
Niles,Calif. P1 .....4.85
N.Tonawanda,N.Y. B11.4.30
Pittsburg,Calif. C11 ...5.00
Pittsburgh J5 .....4.30
Portland,Oreg. O4 .....5.05
Seattle B3, N14, P23...5.05
So.Chicago, R2,U5,W14 4.30
So.Duquesne,Pa. U5 ....4.30
So.SanFran.,Calif. B3 ..5.05
Sterling,Ill.(1) N15 ....4.30
Sterling,Ill. N15 .....4.40
Struthers,O. Y1 .....4.30
Torrance,Calif. C11 ....5.00
Warren,O. R2 .....4.30
Weirton,W.Va. W6 .....4.30
Youngstown R2, U5 ....4.30

BARS, Hot-Rolled Alloy
Bethlehem,Pa. B2 ....5.075
Buffalo R2 .....5.075
Canton,O. R2, T7 ....5.075
Clairton,Pa. U5 .....5.075
Detroit R7 .....5.075
Ecorse,Mich. G5 .....5.225
Fontana,Calif. K1 ....6.125
Fairless,Pa. U5 .....5.225
Gary,Ind. U5 .....5.075
Houston S5 .....5.475
Ind.Harbor,Ind. I-2, Y1.5.075
Johnstown,Pa. B2 .....5.075
KansasCity,Mo. S5 ....5.675
Lackawanna,N.Y. B2..5.075
LosAngeles B3 .....6.125
Massillon,O. R2 .....5.075
Midland,Pa. C18 .....5.075
So.Chicago R2, U5, W14 5.075
So.Duquesne,Pa. U5 ..5.075
Struthers,O. Y1 .....5.075
Warren,O. C17 .....5.075
Youngstown U5 .....5.075

BARS & SMALL SHAPES, H.R. High-Strength Low-Alloy
Aliquippa,Pa. J5 .....6.45
Bessemer,Ala. T2 .....6.45
Bethlehem,Pa. B2 .....6.45
Clairton,Pa. U5 .....6.45
Cleveland R2 .....6.45
Ecorse,Mich. G5 .....6.60
Fairfield,Ala. T2 .....6.45
Fontana,Calif. K1 .....7.70
Gary,Ind. U5 .....6.45
Houston S5 .....6.85
Ind.Harb.,Ind. I-2, Y1..6.45
Johnstown,Pa. B2 .....6.45
KansasCity,Mo. S5 ....7.05
Lackawanna,N.Y. B2 ..6.45
LosAngeles B3 .....7.15
Pittsburgh J5 .....6.45
Seattle B3 .....7.20
So.Chicago W14 .....6.45
So.Duquesne,Pa. U5 ...6.45
So.SanFrancisco B3 ....7.20
Struthers,O. Y1 .....6.45
Warren,O. R2 .....6.45
Youngstown U5 .....6.45

BAR SIZE ANGLES; H.R. Carbon
Bethlehem,Pa. B2 .....4.45

BAR SIZE ANGLES; S. Shapes
Aliquippa,Pa. J5 .....4.30
Atlanta A11 .....4.50
Fontana,Calif. K1 .....5.00
Niles,Calif. P1 .....4.85
Portland,Oreg. O4 .....5.05
SanFrancisco S7 .....4.70

BAR SHAPES, Hot-Rolled Alloy
Clairton,Pa. U5 .....5.20
Gary,Ind. U5 .....5.20
Houston S5 .....5.60
KansasCity S5 .....5.80
Youngstown U5 .....5.20

BARS, Cold-Finished Carbon
Ambridge,Pa. W18 ....5.40
BeaverFalls,Pa. M12,R2 5.40
Buffalo B5 .....5.45
Camden,N.J. P13 .....5.85
Carnegie,Pa. C12 .....5.40
Chicago W18 .....5.40
Cleveland A7, C20 ....5.40
Detroit R7 .....5.40
Detroit B5, P17 .....5.60
Donora,Pa. A7 .....5.40
Elyria,O. W8 .....5.40
FranklinPark,Ill. N5 ....5.40
Gary,Ind. R2 .....5.40
GreenBay,Wis. F7 .....5.40
Hammond,Ind. L2, M13.5.40
Hartford,Conn. R2 ....5.90
Harvey,Ill. B5 .....5.40
LosAngeles R2, S30 ....6.85
Mansfield,Mass. B5 ....5.95
Massillon,O. R2, R8 ....5.40
Monaca,Pa. S17 .....5.40
Newark,N.J. W18 .....5.85
NewCastle,Pa.(17) B4 ..5.40
Pittsburgh J5 .....5.40
Plymouth,Mich. P5 ....5.65
Putnam,Conn. W18 ....5.95
Readville,Mass. C14 ....5.95
St.Louis,Mo. M5 .....5.70
So.Chicago,Ill. W14 ....5.40
SpringCity,Pa. K3 .....5.85
Struthers,O. Y1 .....5.40
Waukegan,Ill. A7 .....5.40
Worcester,Mass. W19 ...5.85
Youngstown F3, Y1 ....5.40

BARS, Cold-Finished Carbon (Turned and Ground)
Cumberland,Md.(5) C19.4.65

BARS, Cold-Finished Alloy
Ambridge,Pa. W18 ....6.625
BeaverFalls,Pa. M12,R2 6.625
Bethlehem,Pa. B2 .....6.625
Buffalo B5 .....6.625
Camden,N.J. P13 .....6.80
Canton,O. T7 .....6.625
Carnegie,Pa. C12 .....6.625
Chicago W18 .....6.625
Cleveland A7, C20 ....6.625
Detroit R7 .....6.625
Detroit B5, P17 .....6.825
Donora,Pa. A7 .....6.625
Elyria,O. W8 .....6.625
Gary,Ind. R2 .....6.625
GreenBay,Wis. F7 .....6.625
Hammond,Ind. L2, M13 6.625
Hartford,Conn. R2 ....6.925
Harvey,Ill. B5 .....6.625
Lackawanna,N.Y. B2..6.625
LosAngeles S30 .....8.30
Mansfield,Mass. B5 ...6.925
Massillon,O. R2, R8 ...6.625
Midland,Pa. C18 .....6.625
Monaca, Pa. S17 .....6.625
Newark,N.J. W18 .....6.80
Plymouth,Mich. P5 ....6.825
So.Chicago W14 .....6.625
SpringCity,Pa. K3 .....6.80
Struthers,O. Y1 .....6.625
Warren,O. C17 .....6.625
Waukegan,Ill. A7 .....6.625
Worcester,Mass. A7 ...6.925
Youngstown F3, Y1 ....6.625

BARS, Reinforcing (To fabricators)
Ala.City,Ala. R2 .....4.30
Atlanta A11 .....4.50
Birmingham C15 .....4.30
Buffalo R2 .....4.30
Cleveland R2 .....4.30
Emeryville,Calif. J7 ....5.05
Fairfield,Ala. T2 .....4.30
Fairless,Pa. U5 .....4.45
Fontana,Calif. K1 ....5.00
Ft.Worth,Tex.(42) T4 ..4.90
Gary,Ind. U5 .....4.30
Houston S5 .....4.70

Ind.Harbor, Ind. I-2, Y1 4.30
Johnstown,Pa. B2 ..... 4.30
KansasCity,Mo. S5 ..... 4.90
Lackawanna,N.Y. B2 ..... 4.30
LosAngeles B3 ..... 5.00
Milton,Pa. M18 ..... 4.30
Minnequa,Colo C10 ..... 4.75
Niles,Calif. P1 ..... 4.85
Pittsburg,Calif. C11 ..... 5.00
Pittsburgh J5 ..... 4.30
Portland,Oreg. O4 ..... 5.05
SandSprings,Okla. S5 ..... 5.15
Seattle B3, N14, P23 ..... 5.05
So.Chicago R2 ..... 4.30
So.Duquesne,Pa. U5 ..... 4.30
So.SanFrancisco B3 ..... 5.05
SparrowsPoint,Md. B2 ..... 4.30
Sterling,Ill.(1) N15 ..... 4.30
Sterling,Ill. N15 ..... 4.40
Struthers,O. Y1 ..... 4.30
Torrance,Calif. C11 ..... 5.00
Youngstown R2, U5 ..... 4.30

BARS, Reinforcing (Fabricated; to consumers)

Johnstown,Pa., ¼-1" B2 5.70
KansasCity S5 ..... 6.50
LosAngeles B3 ..... 5.95
Marion,O. P11 ..... 5.55
Seattle B3, N14, P23 ..... 6.15
So.SanFrancisco B3 ..... 6.00
SparrowsPt. ½-1" B2 ..... 5.70
Williamsport,Pa. S19 ..... 5.60

RAIL STEEL BARS

Avis,Pa.(3) J8 ..... 4.25
ChicagoHts.(3) C2, I-2 ..... 4.20
ChicagoHts.(4) C2, I-2 ..... 4.30
Ft.Worth,Tex.(26) T4 ..... 4.75
Franklin,Pa. (3) F5 ..... 4.20
Franklin,Pa. (4) F5 ..... 4.30
Marion,O.(3) P11 ..... 4.15
Moline,Ill.(3) R2 ..... 4.30
Tonawanda(3) B12 ..... 4.15
Tonawanda(4) B12 ..... 4.30
Williamsport,Pa.(3) S19 4.30

BARS, Wrought Iron

Economy,Pa.(S.R.) B14 10.85
Economy,Pa.(D.R.) B14 13.50
Economy(Staybolt) B14 13.80
McK.Rks.(S.R.) L5 ..... 10.85
McK.Rks.(D.R.) L5 ..... 14.75
McK.Rks.(Staybolt) L5 16.25

SHEETS

SHEETS, Hot-Rolled Steel (18 gage and heavier)

Ala.City,Ala. R2 ..... 4.05
Allenport,Pa. P7 ..... 4.05
Ashland,Ky.(8) A10 ..... 4.05
Cleveland J5, R2 ..... 4.05
Conshohocken,Pa. A3 ..... 4.10
Detroit(8) M1 ..... 4.20
Ecorse,Mich. G5 ..... 4.20
Fairfield,Ala. T2 ..... 4.05
Fairless,Pa. U5 ..... 4.10
Fontana,Calif. K1 ..... 4.825
Gary,Ind. U5 ..... 4.05
Geneva,Utah C11 ..... 4.15
GraniteCity,Ill. G4 ..... 4.25
Houston S5 ..... 4.45
Ind.Harbor,Ind. I-2, Y1 4.05
Irvin,Pa. U5 ..... 4.05
Kokomo,Ind. C16 ..... 4.15
Lackawanna,N.Y. B2 ..... 4.05
Mansfield,O. E6 (37) 4.05
Mansfield,O. E6 (38) 4.80
Munhall,Pa. U5 ..... 4.05
Newport,Ky. N9 ..... 4.05
Niles,O. N12 ..... 4.05
Pittsburg,Calif. C11 ..... 4.75
Pittsburgh J5 ..... 4.05
Portsmouth,O. P12 ..... 4.05
Riverdale,Ill. A1 ..... 4.05
Sharon,Pa. S3 ..... 4.05
So.Chicago,Ill. W14 ..... 4.05
SparrowsPoint,Md. B2 ..... 4.05
Steubenville,O. W10 ..... 4.05
Warren,O. R2 ..... 4.05
Weirton,W.Va. W6 ..... 4.05
Youngstown U5, Y1 ..... 4.05

SHEETS, H.R. (19 ga. lighter)

Ala.City,Ala. R2 ..... 5.35
Kokomo,Ind. C16 ..... 5.20
Niles,O. N12 ..... 4.95

SHEETS, H.R. (14 ga. heavier) High-Strength Low-Alloy

Cleveland J5, R2 ..... 6.10
Conshohocken,Pa. A3 ..... 6.15
Ecorse,Mich. G5 ..... 6.25
Fairfield,Ala. T2 ..... 6.10
Fairless,Pa. U5 ..... 6.15
Fontana,Calif. K1 ..... 6.875
Gary,Ind. U5 ..... 6.10
Ind.Harbor,Ind. I-2, Y1 6.10
Irvin,Pa. U5 ..... 6.10
Lackawanna(35) B2 ..... 6.10
Munhall,Pa. U5 ..... 6.10
Pittsburgh J5 ..... 6.10
Sharon,Pa. S3 ..... 6.10
So.Chicago,Ill. U5 ..... 6.10
SparrowsPoint(36) B2 ..... 6.10
Warren,O. R2 ..... 6.10
Weirton,W.Va. W6 ..... 6.10
Youngstown U5, Y1 ..... 6.10

SHEETS, Hot-Rolled Ingot Iron (18 Gage and Heavier)

Ashland,Ky.(8) A10 ..... 4.30
Cleveland R2 ..... 4.65
Ind.Harbor,Ind. I-2 ..... 4.30
Warren,O. R2 ..... 4.65

SHEETS, Cold-Rolled Steel (Commercial Quality)

Allenport,Pa. P7 ..... 4.95
Cleveland J5, R2 ..... 4.95
Conshohocken,Pa. A3 ..... 5.00
Ecorse,Mich. G5 ..... 5.10
Fairfield,Ala. T2 ..... 4.95
Fairless,Pa. U5 ..... 5.00
Follansbee,W.Va. F4 ..... 4.95
Fontana,Calif. K1 ..... 6.05
Gary,Ind. U5 ..... 4.95
GraniteCity,Ill. G4 ..... 5.15
Ind.Harbor,Ind. I-2, Y1 4.95
Irvin,Pa. U5 ..... 4.95
Lackawanna,N.Y. B2 ..... 4.95
Middletown,O. A10 ..... 4.95
Pittsburg,Calif. C11 ..... 5.90
Pittsburgh J5 ..... 4.95
Portsmouth,O. P12 ..... 4.95
SparrowsPoint,Md. B2 ..... 4.95
Steubenville,O. W10 ..... 4.95
Warren,O. R2 ..... 4.95
Weirton,W.Va. W6 ..... 4.95
Youngstown Y1 ..... 4.95

SHEETS, Cold-Rolled High-Strength Low-Alloy

Cleveland J5, R2 ..... 7.50
Ecorse,Mich. G5 ..... 7.65
Fairless,Pa. U5 ..... 7.55
Fontana,Calif. K1 ..... 8.55
Gary,Ind. U5 ..... 7.50
IndianaHarbor,Ind. Y1 ..... 7.50
Irvin,Pa. U5 ..... 7.50
Lackawanna(37) B2 ..... 7.50
Pittsburgh J5 ..... 7.50
SparrowsPoint(38) B2 ..... 7.50
Warren,O. R2 ..... 7.50
Weirton,W.Va. W6 ..... 7.50
Youngstown Y1 ..... 7.50

SHEETS, Cold-Rolled Ingot Iron

Cleveland R2 ..... 5.55
Middletown,O. A10 ..... 5.45
Warren,O. R2 ..... 5.55

SHEETS, Culvert (16 Ga.)	Cu Alloy	Cu Fe
Ashland,Ky. A10	6.50	....
Canton,O. R2	5.70	6.15
Fairfield T2	5.70	....
Gary,Ind. U5	5.70	5.95
Ind.Harbor I-2	6.25	6.50
Irvin,Pa. U5	5.70	....
Kokomo,Ind. C16	6.35	....
MartinsFry.,O. W10	6.25	....
Newport,Ky. N9	6.25	6.50
Pitts.,Calif. C11	6.45	....
SparrowsPt. B2	5.70	....

SHEETS, Culvert	Pure Iron
Ashland,Ky. A10	6.75
MartinsFerry,O. W10	6.50
Gary,Ind. U5	5.95

SHEETS, Galvanized Steel Hot-Dipped

Ala.City,Ala. R2 ..... 5.45‡
Ashland,Ky. A10 ..... 5.45*
Butler,Pa. A10 ..... 5.45†
Canton,O. R2 ..... 5.45‡
Dover,O. R1 ..... 5.45‡
Fairfield,Ala. T2 ..... 5.45*
Gary,Ind. U5 ..... 5.45*
GraniteCity,Ill. G4 ..... 5.65‡
Ind.Harbor,Ind. I-2 ..... 5.45†
Irvin,Pa. U5 ..... 5.45†
Kokomo,Ind. C16 ..... 5.55‡
MartinsFerry,O. W10 ..... 5.45*
Middletown,O. A10 ..... 5.45†
Newport,Ky. N9 ..... 5.45†
Niles,O. N12 ..... 5.45‡
Pittsburg,Calif. C11 ..... 6.20‡
SparrowsPt.,Md. B2 ..... 5.45‡
Steubenville,O. W10 ..... 5.45‡
Weirton,W.Va. W6 ..... 5.45*

*Continuous and noncontinuous. †Continuous. ‡Noncontinuous.

SHEETS, Galvanized High-Strength Low-Alloy

Irvin,Pa. U5 ..... 8.20
SparrowsPoint(39) B2 ..... 8.20

SHEETS, Galvannealed Steel

Canton,O. R2 ..... 5.85
Irvin,Pa. U5 ..... 5.85
Kokomo,Ind. C16 ..... 5.95†
Newport,Ky. N9 ..... 6.00
Niles,O. N12 ..... 6.00

SHEETS, Galvanized Ingot Iron

Ashland,Ky.(8) A10 ..... 5.70
Canton,O. R2 ..... 6.20

SHEETS, Galvanized Ingot Iron (Hot-dipped continuous)

Ashland,Ky. A10 ..... 5.70
Butler,Pa. A10 ..... 5.70
Middletown,O. A10 ..... 5.70

SHEETS, Electrogalvanized

Cleveland(28) R2 ..... 6.30
Niles,O.(28) R2 ..... 6.30
Weirton,W.Va. W6 ..... 6.175

SHEETS, Aluminum Coated

Butler,Pa. A10 ..... 8.625

SHEETS, Enameling Iron

Ashland,Ky.(8) A10 ..... 5.375
Cleveland R2 ..... 5.375
Gary,Ind. U5 ..... 5.375
GraniteCity,Ill. G4 ..... 5.575
Ind.Harbor,Ind. I-2 ..... 5.375
Irvin,Pa. U5 ..... 5.375
Middletown,O. A10 ..... 5.375
Niles,O. N12 ..... 5.375
Youngstown Y1 ..... 5.375

BLUED STOCK, 29 ga.

Follansbee,W.Va. F4 ..... 7.375
Follansbee(23) F4 ..... 6.60
Yorkville,O. W10 ..... 7.375

SHEETS, Long Terne Steel (Commercial Quality)

BeechBottom,W.Va. W10 5.85
Gary,Ind. U5 ..... 5.85
Mansfield,O. E6 ..... 5.85
Middletown,O. A10 ..... 5.85
Niles,O. N12 ..... 5.85
Weirton,W.Va. W6 ..... 5.85

SHEETS, Long Terne, Ingot Iron

Middletown,O. A10 ..... 6.25

SHEETS, Wall Casing

Fontana,Calif. K1 ..... 6.325

Key to Producers

A1 Acme Steel Co.
A3 Alan Wood Steel Co.
A4 Allegheny Ludlum Steel
A5 Alloy Metal Wire Co.
A7 American Steel & Wire
A8 Anchor Drawn Steel Co.
A9 Angell Nail & Chaplet
A10 Armco Steel Corp.
A11 Atlantic Steel Co.

B1 Babcock & Wilcox Co.
B2 Bethlehem Steel Co.
B3 Beth. Pac. Coast Steel
B4 Blair Strip Steel Co.
B5 Bliss & Laughlin Inc.
B8 Braeburn Alloy Steel
B9 Brainard Steel Div., Sharon Steel Corp.
B10 E. & G. Brooke, Wickwire Spencer Steel Div., Colo. Fuel & Iron
B11 Buffalo Bolt Co., Div. Buffalo-Eclipse Corp.
B12 Buffalo Steel Corp.
B14 A. M. Byers Co.
B15 J. Bishop & Co.

C1 Calstrip Steel Corp.
C2 Calumet Steel Div., Borg-Warner Corp.
C4 Carpenter Steel Co.
C5 Central Iron & Steel Div. Barium Steel Corp.
C7 Cleve. Cold Rolling Mills
C8 Cold Metal Products Co.
C9 Colonial Steel Co.
C10 Colorado Fuel & Iron
C11 Columbia-Geneva Steel
C12 Columbia Steel & Shaft.
C13 Columbia Tool Steel Co.
C14 Compressed Steel Shaft.
C15 Connors Steel Div. H. K. Porter Co. Inc.
C16 Continental Steel Corp.
C17 Copperweld Steel Co.
C18 Crucible Steel Co.
C19 Cumberland Steel Co.
C20 Cuyahoga Steel & Wire
C22 Claymont Steel Products Dept. Wickwire Spencer Steel Division
C23 Charter Wire Inc.
C24 G. O. Carlson Inc.
C31 Chester Blast Furnace Inc.

D2 Detroit Steel Corp.
D3 Detroit Tube & Steel
D4 Disston & Sons, Henry
D6 Driver Harris Co.
D7 Dickson Weatherproof Nail Co.
D8 Damascus Tube Co.
D9 Wilbur B. Driver Co.

E1 Eastern Gas&FuelAssoc.
E2 Eastern Stainless Steel
E4 Electro Metallurgical Co.
E5 Elliott Bros. Steel Co.
E6 Empire Steel Corp.

F2 Firth Sterling Inc.
F3 Fitzsimons Steel Co.
F4 Follansbee Steel Corp.
F5 Franklin Steel Div., Borg-Warner Corp.
F6 Fretz-Moon Tube Co.
F7 Ft. Howard Steel & Wire
F8 Ft. Wayne Metals Inc.

G2 Globe Iron Co.
G4 Granite City Steel Co.
G5 Great Lakes Steel Corp.
G6 Greer Steel Co.

H1 Hanna Furnace Corp.
H7 Helical Tube Co.

I-1 Igoe Bros. Inc.
I-2 Inland Steel Co.
I-3 Interlake Iron Corp.
I-4 Ingersoll Steel Div., Borg-Warner Corp.
I-6 Ivins, E., Steel Tube
I-7 Indiana Steel & Wire Co.

J1 Jackson Iron & Steel Co.
J3 Jessop Steel Co.
J4 Johnson Steel & Wire Co.
J5 Jones & Laughlin Steel
J6 Joslyn Mfg. & Supply
J7 Judson Steel Corp.
J8 Jersey Shore Steel Co.

K1 Kaiser Steel Corp.
K2 Keokuk Electro-Metals
K3 Keystone Drawn Steel
K4 Keystone Steel & Wire
K7 Kenmore Metals Corp.

L1 Laclede Steel Co.
L2 LaSalle Steel Co.
L3 Latrobe Steel Co.
L5 Lockhart Iron & Steel
L6 Lone Star Steel Co.
L7 Lukens Steel Co.

M1 McLouth Steel Corp.
M4 Mahoning Valley Steel
M5 Medart Co.
M6 Mercer Pipe Div., Sawhill Tubular Products
M8 Mid-States Steel & Wire
M12 Moltrup Steel Products
M13 Monarch Steel Co.
M14 McInnes Steel Co.
M16 Md. Fine&Special. Wire
M17 Metal Forming Corp.
M18 Milton Steel Prod. Div., Merritt-Chapman&Scott

N1 National-Standard Co.
N2 National Supply Co.
N3 National Tube Div.
N5 Nelsen Steel & Wire Co.
N6 NewEng. HighCarb.Wire
N8 Newman-Crosby Steel
N9 Newport Steel Corp.
N12 Niles Rolling Mill Div.
N14 Nrthwst.Steel Roll. Mills
N15 Northwestern S.&W. Co.
N16 New Delphos Mfg. Co.
O3 Oliver Iron & Steel Corp.
O4 Oregon Steel Mills

P1 Pacific States Steel Corp.
P2 Pacific Tube Co.
P4 Phoenix Iron & Steel Co.
P5 Pilgrim Drawn Steel
P6 Pittsburgh Coke&Chem.
P7 Pittsburgh Steel Co.
P11 Pollak Steel Co.
P12 Portsmouth Division Detroit Steel Corp.
P13 Precision Drawn Steel
P14 Pitts. Screw & Bolt Co.
P15 Pittsburgh Metallurgical
P16 Page Steel & Wire Div., Amer. Chain & Cable
P17 Plymouth Steel Co.
P19 Pitts. Rolling Mills
P20 Prod. Steel Strip Corp.
P23 Pacific Steel Rolling

R1 Reeves Steel & Mfg. Co.
R2 Republic Steel Corp.
R3 Rhode Island Steel Corp.
R5 Roebling's Sons, John A.
R6 Rome Strip Steel Co.
R7 Rotary Electric Steel Co.
R8 RelianceDiv.,EatonMfg.
R9 Rome Mfg. Co.
R10 Rodney Metals Inc.

S1 Seneca Wire & Mfg. Co.
S3 Sharon Steel Corp.
S4 Sharon Tube Co.
S5 Sheffield Steel Div. Armco Steel Corp.
S6 Shenango Furnace Co.
S7 Simmons Co.
S8 Simonds Saw & Steel Co.
S12 Spencer Wire Corp.
S13 Standard Forgings Corp.
S14 Standard Tube Co.
S15 Stanley Works
S17 Superior Drawn Steel Co.
S18 Superior Steel Corp.
S19 Sweet's Steel Co.
S20 Southern States Steel
S23 Superior Tube Co.
S25 Stainless WeldedProducts
S26 Specialty Wire Co. Inc.
S30 Sierra Drawn Steel Corp.

T2 Tenn. Coal & Iron Div.
T3 Tenn.Prod. & Chem.
T4 Texas Steel Co.
T5 Thomas Strip Division, Pittsburgh Steel Co.
T6 Thompson Wire Co.
T7 Timken Roller Bearing
T9 Tonawanda Iron Div. Am. Rad. & Stan.San.
T13 Tube Methods Inc.

U4 Universal-Cyclops Steel
U5 United States Steel Corp.
U6 U. S. Pipe & Foundry
U7 Ulbrich Stainless Steels

V2 Vanadium-Alloys Steel
V3 Vulcan Crucible Steel Co.

W1 Wallace Barnes Co.
W2 Wallingford Steel Co.
W3 Washburn Wire Co.
W4 Washington Steel Corp.
W6 Weirton Steel Co.
W7 W.Va. Steel & Mfg. Co.
W8 West.Auto.Mach.Screw
W9 Wheatland Tube Co.
W10 Wheeling Steel Corp.
W12 Wickwire Spencer Steel Div., Colo. Fuel & Iron
W13 Wilson Steel & Wire Co.
W14 Wisconsin Steel Div., International Harvester
W15 Woodward Iron Co.
W18 Wyckoff Steel Co.
W19 Worcester Pressed Steel

Y1 Youngstown Sheet & Tube

STRIP

STRIP, Hot-Rolled Carbon

Ala.City,Ala.(27) R2....4.05
Allenport,Pa. P7 .....4.05
Alton,Ill. L1 .....4.225
Ashland,Ky.(8) A10 ....4.05
Atlanta A11 .....4.25
Bessemer,Ala. T2 .....4.05
Birmingham C15 .....4.05
Bridgeport,Conn.(10)S15 4.05
Buffalo(27) R2 .....4.05
Conshohocken,Pa. A3....4.10
Detroit M1 .....4.20
Ecorse,Mich. G5 .....4.20
Fairfield,Ala. T2 .....4.05
Fontana,Calif. K1 ....4.825
Gary,Ind. U5 .....4.05
Houston,Tex. S5 .....4.45
Ind.Harbor,Ind. I-2, Y1.4.05
Johnstown,Pa.(25) B2 ..4.05
KansasCity,Mo.(9) S5 ..4.65
Lackaw'na,N.Y.(25) B2.4.05
LosAngeles(25) B3 ....4.80
Milton,Pa. M18 .....4.05
Minnequa,Colo. C10 ....5.15
NewBritain(10) S15 ....4.05
N.Tonawanda,N.Y. B11.4.05
Pittsburg,Calif. C11 ....4.80
Portsmouth,O. P12 ....4.05
Riverdale,Ill. A1 .....4.05
SanFrancisco S7 .....5.00
Seattle(25) B3, P23 ....5.05
Seattle N14 .....5.05
Sharon,Pa. S3 .....4.05
So.Chicago,Ill. W14 ....4.05
So.SanFrancisco(25) B3.4.80
SparrowsPoint,Md. B2 ..4.05
Sterling(1) N15 .....4.05
Sterling,Ill. N15 .....4.15
Torrance,Calif. C11 ....4.80
Warren,O. R2 .....4.05
Weirton,W.Va. W6 ....4.05
Youngstown U5 .....4.05

STRIP, Hot-Rolled Alloy

Bridgeport,Conn.(10)S15 6.45
Carnegie,Pa. S18 .....6.70
Fontana,Calif. K1 .....8.10
Gary,Ind. U5 .....6.70
Houston,Tex. S5 .....7.10
KansasCity,Mo. S5 .....7.30
LosAngeles B3 .....7.90
NewBritn.,Conn.(10)S15 6.45
Newport,Ky. N9 .....6.70
Seattle P23 .....7.80
Sharon,Pa. S3 .....6.70
So.Chicago W14 .....6.70
Youngstown U5 .....6.70

STRIP, Hot-Rolled High-Strength Low-Alloy

Bessemer,Ala. T2 .....6.15
Conshohocken,Pa. A3 ...6.15
Ecorse,Mich. G5 .....6.30
Fairfield,Ala. T2 .....6.15
Fontana,Calif. K1 .....7.25
Gary,Ind. U5 .....6.15
Houston S5 .....6.55
Ind.Harbor,Ind. I-2, Y1.6.15
KansasCity,Mo. S5 ....6.75
Lackawanna,N.Y. B2 ..6.15
LosAngeles(25) B3 .....6.90
Seattle(25) B3, P23.....7.15
Sharon,Pa. S3 .....6.15
So.SanFrancisco(25) B3.6.90
SparrowsPoint,Md. B2 ..6.15
Warren,O. R2 .....6.15
Weirton,W.Va. W6 ....6.15
Youngstown U5, Y1 ....6.15

STRIP, Hot-Rolled Ingot Iron

Ashland,Ky.(8) A10 ....4.30
Warren,O. R2 .....4.65

STRIP, Cold-Rolled Carbon

Anderson,Ind. G6 .....5.75
Baltimore T6 .....5.75
Bridgeport,Conn.(10)S15 5.75
Cleveland A7, J5 .....5.75
Conshohocken,Pa. A3 ..5.80
Dearborn,Mich. D3 .....5.90
Detroit D2, M1, P20 ..5.90
Dover,O. G6 .....5.75
Ecorse,Mich. G5 .....5.90
Follansbee,W.Va. F4 ...5.75
Fontana,Calif. K1 .....7.65
FranklinPark,Ill. T6 ....5.85
Ind.Harbor,Ind. I-2 ....5.85
Indianapolis C8 .....5.90
Lackawanna,N.Y. B2 ...5.75
LosAngeles C1 .....7.80
Mattapan,Mass. T6 ....6.30
Middletown,O. A10 ....5.75
NewBedford,Mass. R10..6.20
NewBritain(10) S15 ....5.75
NewCastle,Pa. B4, E5 ..5.75
NewHaven,Conn. A7 ....6.50
NewHaven,Conn. D2 ....6.20
Pawtucket,R.I. R3 ....6.40
Pawtucket,R.I. N8 ....6.30
Pittsburgh J5 .....5.75
Portsmouth,O. P12 ....5.75
Riverdale,Ill. A1 .....5.85
Rome,N.Y.(32) R6 ....5.75
Sharon,Pa. S3 .....5.75
SparrowsPt.,Md. B2 ....5.75
Trenton,N.J.(31) R5 ..7.30
Wallingford,Conn. W2...6.20
Warren,O. B9, R2, T5..5.75
Weirton,W.Va. W6 .....5.75
Worcester,Mass. A7 ....6.60
Youngstown C8, Y1 ....5.75

STRIP, Cold-Rolled Alloy

Carnegie,Pa. S18 .....12.45
Cleveland A7 .....12.45
Dover,O. G6 .....12.45
Fontana,Calif. K1 ....14.55
FranklinPark,Ill. T6 ..12.45
Harrison,N.J. C18 ....12.45
Mattapan,Mass. T6 ....12.80
Pawtucket,R.I. N8 ....12.80
Sharon,Pa. S3 .....12.45
Worcester,Mass. A7 ...12.75
Youngstown C8.....12.90

STRIP, Cold-Rolled High-Strength Low-Alloy

Cleveland A7, J5 .....8.60
Dearborn,Mich. D3 ....8.75

STRIP, Cold-Finished Spring Steel (Annealed)	0.26-0.40C	0.41-0.60C	0.61-0.80C	0.81-1.05C	1.06-1.35C
Baltimore T6	5.75	8.35	9.30	11.45	14.15
Bridgeport,Conn.(10) S15	5.75	8.05	9.00	11.15	13.85
Bristol,Conn. W1	...	...	9.30	11.45	....
Carnegie,Pa. S18	...	8.05	9.00	11.15	13.85
Cleveland A7	5.75	8.05	9.00	11.15	13.85
Cleveland C7	...	8.05	9.00	11.15	13.85
Dearborn,Mich. D3	5.90	8.25	9.20	....	....
Detroit D2	5.90	8.25	9.20	10.95	....
Dover,O. G6	5.85	8.05	9.00	11.15	13.85
FranklinPark,Ill. T6	5.85	8.05	9.00	11.15	13.85
Harrison,N.J. C18	...	...	9.30	11.45	14.15
Indianapolis C8	6.00	8.20	9.00	11.15	13.85
Mattapan,Mass. T6	6.30	8.35	9.30	11.45	14.15
NewBritn.,Conn.(10) S15	5.75	8.05	9.00	11.15	13.85
NewCastle,Pa. B4	5.75	8.05	9.00	11.15	....
NewCastle,Pa. E5	5.75	8.05	9.00	11.15	13.85
NewHaven,Conn. D2	6.20	8.35	9.30	11.25	....
NewYork W3	...	8.35	9.30	11.45	14.15
Pawtucket,R.I. N8	6.30	8.35	9.30	11.45	14.15
Riverdale,Ill.(1) A1	5.85	8.05	9.00	11.15	13.85
Rome,N.Y.(32) R6	5.75	8.05	9.00	10.95	13.25
Sharon,Pa. S3	5.75	8.05	9.00	11.15	13.85
Trenton,N.J. R5	...	8.35	9.30	11.45	14.15
Wallingford,Conn. W2	6.20	8.35	9.30	11.45	14.15
Warren,O. T5	5.75	8.05	9.00	11.15	13.85
Weirton,W.Va. W6	5.75	8.05	9.00	11.15	13.85
Worcester,Mass. A7, T6	6.60	8.35	9.30	11.45	14.15
Youngstown C8	5.85	8.05	9.00	11.15	13.85
Spring Steel (Tempered)					
Bristol,Conn. W1	...	...	12.90	15.60	....
Buffalo W12	...	...	12.90	....	....
Harrison,N.J. C18	...	...	12.90	15.60	19.00
NewYork W3	...	...	12.90	15.60	19.00
Trenton,N.J. R5	...	...	12.90	15.60	19.00
Worcester,Mass. T6	...	...	12.90	15.60	19.00
Worcester,Mass. W12	...	...	12.90	....	....
Youngstown C8	...	...	13.25	15.95	19.35

Dover,O. G6 .....8.60
Ecorse,Mich. G5 .....8.75
Lackawanna,N.Y. B2 ..8.425
Pittsburgh J5 .....8.60
Sharon,Pa. S3 .....8.60
SparrowsPoint,Md. B2..8.425
Warren,O. R2 .....8.60
Weirton,W.Va. W6 .....8.60
Youngstown Y1 .....8.60

STRIP, Cold-Rolled Ingot Iron

Warren,O. R2 .....6.35

STRIP, Electrogalvanized

Dover,O. G6 .....5.75*
Riverdale,Ill. A1 .....5.85*
Youngstown C8 .....5.75*
Warren,O. B9 .....5.75*

*Plus galvanizing extras.

STRIP, Galvanized (Continuous)

Sharon,Pa. S3 .....6.15
Warren,O. B9 .....6.15

TIGHT COOPERAGE HOOP

Atlanta A11 .....4.775
Riverdale,Ill. A1 .....4.625
Sharon,Pa. S3 .....4.475
Youngstown U5 .....4.475

SILICON STEEL

H.R. SHEETS (22 Ga., cut lengths)	Field	Arma-ture	Electric	Motor	Dyna-mo
BeechBottom,W.Va. W10	....	...	9.10	10.10	11.00
Brackenridge,Pa. A4	....	...	9.10	10.10	11.00
IndianaHarbor,Ind. I-2	8.025	8.50	9.10	10.10	....
Mansfield,O. E6	8.025	8.50	9.10	10.10	11.00
Newport,Ky. N9	8.025	8.50	9.10	10.10	11.00
Niles,O. N12	8.025	8.50	9.10	10.10	....
Vandergrift,Pa. U5	....	8.50	9.10	10.10	11.00
Warren,O. R2	8.025	8.50	9.10	10.10	11.00
Zanesville,O. A10	....	8.50	9.10	10.10	11.00

C.R. COILS & CUT LENGTHS (22 Ga.)

Fully Processed (Semiprocessed 1½c lower)	Field	Arma-ture	Electric	Motor	Dyna-mo
Brackenridge,Pa. A4	....	...	9.85	10.85	11.75
GraniteCity,Ill. G4	8.425*	8.95*	9.55*	10.55*	....
IndianaHarbor,Ind. I-2	8.225	8.75*	9.35*	....	....
Vandergrift,Pa. U5	....	9.25†	9.85†	10.85†	11.75†
Vandergrift,Pa. U5	8.225*	8.75*	9.35*	10.35*	11.25*
Warren,O. R2	8.225†	9.25	9.85	10.85	11.75
Zanesville,O. A10	....	9.25	9.85	10.85	11.75

H.R. SHEETS (22 Ga., cut lengths)	Transformer Grade T-72	T-65	T-58	T-52
BeechBottom,W.Va. W10	11.95	12.50	13.00	14.00
Brackenridge,Pa. A4	11.95	....	....	....
Newport,Ky. N9	11.95	....	....	....
Vandergrift,Pa. U5	11.95	12.50	13.00	14.00
Zanesville,O. A10	11.95‡	12.50‡	13.00‡	14.00‡

C.R. COILS & CUT LENGTHS (22 Ga.)	Grain Oriented T-100	T-90	T-80	T-73	T-72
Brackenridge,Pa. A4	....	15.00	16.60	17.10	....
Butler,Pa. A10	....	....	16.60	17.10	....
Vandergrift,Pa. U5	14.00	15.00	16.60	17.10	12.70
Warren,O. R2	....	....	....	....	12.70‡

* Semiprocessed. † Fully processed only. ‡ Coils annealed; semiprocessed ½c lower. § Coils. ¾-cent higher.

TIN MILL PRODUCTS

TIN PLATE, Electrolytic (Base Box)	0.25 lb	0.50 lb	0.75 lb
Aliquippa,Pa. J5	$7.50	$7.75	$8.15
Fairfield,Ala. T2	7.60	7.85	8.25
Fairless,Pa. U5	7.60	7.85	8.25
Gary,Ind. U5	7.50	7.75	8.15
GraniteCity,Ill. G4	7.60	7.85	8.25
IndianaHarbor,Ind. I-2, Y1	7.50	7.75	8.15
Irvin,Pa. U5	7.50	7.75	8.15
Niles,O. R2	7.50	7.75	8.15
Pittsburg,Calif. C11	8.25	8.50	8.90
SparrowsPoint,Md. B2	7.60	7.85	8.25
Weirton,W.Va. W6	7.50	7.75	8.15
Yorkville,O. W10	7.50	7.75	8.15

ELECTROTIN (22-27 Gage; Dollars per 100 lb)

Aliquippa,Pa. J5	6.175	....	....
Niles,O. R2	6.175	6.375	6.575

TIN PLATE, American Coke (Base Box)	1.25 lb	1.50 lb
Aliquippa,Pa. J5	$8.80	$9.05
Fairfield,Ala. T2	8.90	9.15
Fairless,Pa. U5	8.90	9.15
Gary,Ind. U5	8.80	9.05
Ind.Har. I-2, Y1	8.80	9.05
Irvin,Pa. U5	8.80	9.05
Pitts.,Cal. C11	9.55	9.80
Sp.Pt.,Md. B2	8.90	9.15
Warren,O. R2	8.80	9.05
Weirton,W.Va. W6	8.80	9.05
Yorkville,O. W10	8.80	9.05

BLACK PLATE (Base Box)

Aliquippa,Pa. J5 .....$6.60
Fairfield,Ala. T2 .....6.70
Fairless,Pa. U5 .....6.70
Gary,Ind. U5 .....6.60
GraniteCity,Ill. G4 .....6.70
Ind.Harbor,Ind. I-2, Y1.6.60
Irvin,Pa. U5 .....6.60
Niles,O. R2 .....6.60
Pittsburg,Calif. C11 ....7.35
SparrowsPoint,Md. B2 ..6.70
Warren,O. R2 .....6.60
Weirton,W.Va. W6 .....6.60
Yorkville,O. W10 .....6.60

HOLLOWARE ENAMELING Black Plate (29 gage)

Follansbee,W.Va. F4 ...6.20
Gary,Ind. U5 .....6.20
GraniteCity,Ill. G4 .....6.30
Ind.Harbor,Ind. Y1 ....6.20
Irvin,Pa. U5 .....6.20
Yorkville,O. W10 .....6.20

MANUFACTURING TERNES (Special Coated; Base Box)

Gary,Ind. U5 .....$7.85
Irvin,Pa. U5 .....7.85
Yorkville,O. W10 .....7.85

MANUFACTURING TERNES (Light Coated, 6 lb; Base Box)

Yorkville,O. W10 .....$8.75

ROOFING SHORT TERNES (8 lb Coated)

Gary,Ind. U5 .....9.85

WIRE

WIRE, Manufacturers Bright, Low Carbon

AlabamaCity,Ala. R2 ..5.75
Aliquippa,Pa. J5 .....5.75
Alton,Ill. L1 .....6.925
Atlanta A11 .....5.95
Bartonville,Ill. K4 .....5.85
Buffalo W12 .....5.75
Chicago W13 .....5.75
Cleveland A7, C20 .....5.75
Crawfordsville,Ind. M8..5.85
Donora,Pa. A7 .....5.75
Duluth,Minn. A7 .....5.75
Fairfield,Ala. T2 .....5.75
Fostoria,O.(24) S1 .....5.95
Houston S5 .....6.15
Jacksonville,Fla. M8 ...6.27
Johnstown,Pa. B2 .....5.75
Joliet,Ill. A7 .....5.75
KansasCity,Mo. S5 .....6.35
Kokomo,Ind. C16 .....5.85
LosAngeles B3 .....6.70
Minnequa,Colo. C10 ....6.00
Monessen,Pa. P7 .....5.75
Newark 6-8 ga. I-1 ....6.40
No.Tonawanda B11 ....5.75
Palmer,Mass. W12 .....6.05
Pittsburg,Calif. C11 ....6.70
Portsmouth,O. P12 .....5.75
Rankin,Pa. A7 .....5.75
So.Chicago,Ill. R2 .....5.75
So.SanFrancisco C10 ...6.70
SparrowsPoint,Md. B2 ..5.85
Sterling,Ill.(1) N15 ....5.75
Sterling,Ill. N15 .....5.85
Struthers,O. Y1 .....5.75
Waukegan,Ill. A7 .....5.75
Worcester,Mass. A7 ....6.05

WIRE, MB Spring, High Carbon

Aliquippa,Pa. J5 .....7.20
Alton,Ill. L1 .....7.375
Bartonville,Ill. K4 .....7.30
Buffalo W12 .....7.20
Cleveland A7 .....7.20
Donora,Pa. A7 .....7.20
Duluth,Minn. A7 .....7.20
Fostoria,O. S1 .....7.20
Johnstown,Pa. B2 .....7.20
LosAngeles B3 .....8.15
Millbury,Mass.(12) N6 ..7.50
Minnequa,Colo. C10 ....7.45
Monessen,Pa. P7, P16...7.20
Muncie,Ind. I-7 .....7.40
Palmer,Mass. W12 .....7.50
Pittsburg,Calif. C11 ....8.15
Portsmouth,O. P12 .....7.20
Roebling,N.J. R5 .....7.50
So.Chicago,Ill. R2 .....7.20
So.SanFrancisco C10 ...8.15
SparrowsPt.,Md. B2 ....7.30
Struthers,O. Y1 .....7.20
Trenton,N.J. A7 .....7.50
Waukegan,Ill. A7 .....7.20
Worcester A7,J4,T6,W12 7.50

WIRE, Upholstery Spring

Aliquippa,Pa. J5 .....6.90
Alton,Ill. L1 .....7.075
Buffalo W12 .....6.90
Cleveland A7 .....6.90
Donora,Pa. A7 .....6.90
Duluth,Minn. A7 .....6.90
Johnstown,Pa. B2 .....6.90
KansasCity,Mo. S5 ....7.50
LosAngeles B3 .....7.85
Minnequa,Colo. C10 ...7.075
Monessen,Pa. P7, P16 ..6.90
NewHaven,Conn. A7 ...7.20
Palmer,Mass. W12 .....7.20
Pittsburg,Calif. C11 ....7.85
Portsmouth,O. P12 .....6.90
Roebling,N.J. R5 .....7.20
So.Chicago,Ill. R2 .....6.90
So.SanFrancisco C10 ...7.85
SparrowsPoint,Md. B2 ..7.00
Trenton,N.J. A7 .....7.20
Waukegan,Ill. A7 .....6.90
Worcester,Mass. A7 ....7.20

WIRE, Fine & Weaving (8" Coils)

Alton,Ill. L1 .....11.375
Bartonville,Ill. K4 ....11.30
Buffalo W12 .....11.20
Chicago W13 .....11.20
Cleveland A7 .....11.20
Crawfordsville,Ind. M8..11.30
Fostoria,O. S1 .....11.20
Jacksonville,Fla. M8 ..11.73
Johnstown,Pa. B2 .....11.20
Kokomo,Ind. C16 .....11.20
Minnequa,Colo. C10 ...10.95
Monessen,Pa. P16 .....11.20
Muncie,Ind. I-7 .....11.40
Palmer,Mass. W12 .....11.50
Roebling,N.J. R5 .....11.50
So.SanFrancisco C10 ...11.55
Waukegan,Ill. A7 .....11.20
Worcester,Mass. A7,T6.11.50

WIRE, Galv'd ACSR for Cores

Bartonville,Ill. K4 .....9.90
Buffalo W12 .....9.90
Johnstown,Pa. B2 .....9.90
Minnequa,Colo. C10 ..10.025
Monessen,Pa. P16 .....9.90
Muncie,Ind. I-7 .....10.10
Portsmouth,O. D2 .....9.90
Roebling,N.J. R5 .....10.20
SparrowsPt.,Md. B2 ...10.00

ROPE WIRE (A)

Alton,Ill. L1 .....9.45
Bartonville,Ill. K4 .....9.35
Buffalo W12 .....9.75
Fostoria,O. S1 .....9.75
Johnstown,Pa. B2 .....9.75
Monessen,Pa. P7 .....9.35
Monessen,Pa. P16 .....9.75
Muncie,Ind. I-7 .....9.95
Palmer,Mass. W12 .....10.05
Portsmouth,O. P12 .....9.35
Roebling,N.J. R5 .....10.05
SparrowsPt. B2 .....9.85
Struthers,O. Y1 .....9.75
Worcester J4, T6 .....9.65

(A) Plow and Mild Plow; add 0.25c for Improved Plow.

WIRE

(Continued)

WIRE, Tire Bead

Alton, Ill. L1 .....12.75
Bartonville,Ill. K4 .....13.25
Monessen,Pa. P16 ....13.15
Portsmouth,O. P12 ....13.15
Roebling,N.J. R5 .....13.45

WIRE, Cold-Rolled Flat

Anderson,Ind. G6 .....7.95
Baltimore T6 .....8.25
Buffalo W12 .....7.95
Cleveland A7 .....7.95
Crawfordsville,Ind. M8 .8.05
Dover,O. G6 .....7.95
Fostoria,O. S1 .....7.95
Kokomo,Ind. C16 .....8.05
FranklinPark,Ill. T6 ...8.05
Massillon,O. R8 .....7.95
Milwaukee C23 .....8.15
Monessen,Pa. P7, P16..7.95
Pawtucket,R.I. N8 .....8.25
Rome,N.Y.(32) R6 ....7.95
Trenton,N.J. R5 .....8.25
Worcester A7, T6, W12.8.25

WIRE, Merchant Quality

(6 to 8 gage)	An'ld Galv.
Ala.City,Ala. R2	6.90 7.30**
Aliquippa J5	....6.90 7.425‡
Atlanta A11	.....7.00 7.55
Bartonville(48) K4	7.00 7.55
Buffalo W12	....6.90 7.30†
Cleveland A7	....6.90 ....
Crawfordsville M8	.7.00 7.55
Donora,Pa. A7	....6.90 7.30†
Duluth,Minn. A7	..6.90 7.30†
Fairfield T2	.....6.90 7.30†
Houston,Tex. S5	..7.30 7.70†
Jacksonville,Fla. M8	7.425 7.95
JohnstownB2(48)	.6.90 7.45*
Joliet,Ill. A7	....6.90 7.30†
KansasCity,Mo. S5	7.50 7.90†
Kokomo C16	.....7.00 7.40†
LosAngeles B3	..7.85 ....
Minnequa C10	..7.15 7.55**
Monessen P7 (48)	6.90 7.45
Palmer W12	.....7.20 7.60†
Pitts.,Calif. C11	..7.85 8.25†
Portsmouth,O. P12	6.90 ....
Rankin A7	.....6.90 7.30†
So.Chicago R2	...6.90 7.30**
S.S.Fran. C10	...7.85 8.25**
SparrwsPt.B2(48)	7.00 7.55*
Sterling(1)(48)N15	6.90 7.45
Struthers,O.(48)Y1	6.90 7.40‡
Worcester A7	....7.20 ....

* Based on 11c zinc; † 5c zinc; ‡ Less than 10c zinc; **Subject to zinc equalization extras.

WOVEN FENCE, 9-15½Ga. Col.

Ala.City,Ala R2 .....146**
Ala.City, 17 ga. R2 ...241**
Ala.City, 18 ga. R2 ..251**
Aliq'ppa,Pa.9-14½ga.J5 149§
Atlanta A11 151
Bartonville,Ill. K4 151
Crawfordsville,Ind. M8 .151
Donora,Pa. A7 .....146†
Duluth,Minn. A7 .....146†
Fairfield,Ala. T2 .....146†
Houston,Tex. S5 .....154†
Johnstown,Pa. (43) B2 ..149
Joliet,Ill. A7 .....146†
KansasCity,Mo. S5 ....158†
Kokomo,Ind. C16 .....148†
Minnequa,Colo. C10 ..154**
Monessen,Pa. 9 ga. P17..151
Pittsburg,Calif. C11 ....169†
Rankin,Pa. A7 .....146†
So.Chicago,Ill. R2 ....146**
Sterling,Ill.(1) N15 149

† Based on 5c zinc; * 11c zinc; § 10c zinc; **Subject to zinc equalization extras.

BALE TIES, Single loop **Col.**

AlabamaCity,Ala. R2 ...155
Atlanta A11 157
Bartonville, Ill. K4 157
Crawfordsville,Ind. M8 .157
Donora,Pa. A7 155
Duluth,Minn. A7 155
Fairfield,Ala. T2 155
Joliet,Ill. A7 155
Houston S5 163
KansasCity,Mo. S5 167
Kokomo,Ind. C16 157
Minnequa,Colo. C10 160
Pittsburg,Calif. C11 179
So.Chicago,Ill. R2 155
So.SanFran.,Calif. C10 ..179
SparrowsPoint,Md. B2 ..157
Sterling,Ill.(1) N15 155

WIRE, Barbed **Col.**

Alabama,City,Ala. R2 159**
Aliquippa J5 .....156§
Atlanta A11 164
Bartonville,Ill. K4 164
Crawfordsville,Ind. M8 ..164
Donora,Pa. A7 .....159†
Duluth,Minn. A7 .....159†
Fairfield,Ala. T2 .....159†
Houston,Tex. S5 .....167†
Johnstown,Pa. B2 .....162*
Joliet,Ill. A7 .....159†
KansasCity,Mo. S5 .....171†
Kokomo,Ind. C16 .....161†
Minnequa,Colo. C10 ..165**
Monessen,Pa. P7 163
Pittsburg,Calif. C11 ....179†
Rankin,Pa. A7 .....159†
So.Chicago,Ill. R2 ....159**
S. SanFrancisco C10 ..179**
SparrowsPoint,Md. B2..164*
Sterling,Ill.(1) N15 162

† Based on 5c zinc; * 11c zinc; § 10c zinc; **Subject to zinc equalization extras.

WIRE (16 gage)	An'd Galv. Stone	Stone
Ala.City R2	...13.15	14.70**
Bartonville K4	..13.25	15.10
Buffalo W12	...13.15	....
Cleveland A7	...13.15	....
CrawfrdsvilleM8	13.25	15.10
Fostoria,O. S1	..13.25	14.80†
Johnstown B2	..13.15	15.00*
Kokomo C16	...13.25	15.10*
Minnequa C10	..13.40	15.10**
Palmer,Mas.W12	13.15	14.70*
Pitts.,Calif. C11	13.50	15.05†
So.Chicago R2	..13.15	14.70
SparrowsPt. B2	13.25	15.10*
Sterling(1)	N15.13.15	15.00
Waukegan A7	..13.15	14.70†
Worcester A7	..13.45	....

* Based on 11c zinc; † 5c zinc; ‡ 10c zinc; ** Subject to zinc equalization extras.

NAILS, Stock
To dealers & mfrs. (7) **Col.**

AlabamaCity,Ala. R2 137
Aliquippa,Pa. J5 137
Atlanta A11 139
Bartonville,Ill. K4 139
Chicago,Ill. W13 137
Cleveland A9 142
Crawfordsville,Ind. M8...139
Donora,Pa. A7 137
Duluth,Minn. A7 137
Fairfield,Ala. T2 137
Galveston,Tex. D7 139
Houston,Tex. S5 145
Johnstown,Pa. B2 137
Joliet,Ill. A7 137
KansasCity,Mo. S5 149
Kokomo,Ind. C16 139
Minnequa,Colo. C10 142
Monessen,Pa. P7 137
Pittsburg,Calif. C11 156
Rankin,Pa. A7 137
So.Chicago,Ill. R2 137
SparrowsPt.,Md. B2 139
Sterling,Ill.(1) N15 137
Worcester,Mass. A7 143

NAILS, CUT (100 lb keg)
To dealers (33)

Conshohocken,Pa. A3 ..$8.30
Wheeling,W.Va. W10 ...8.30

STAPLES, Polished Stock
To dealers & mfrs. (7) **Col.**

Aliquippa,Pa. J5 138
Atlanta A11 140
Bartonville,Ill. K4 140
Crawfordsville,Ind. M8 ..140
Donora,Pa. A7 138
Duluth,Minn. A7 138
Fairfield,Ala. T2 138
Johnstown,Pa. B2 138
Joliet,Ill. A7 138
Kokomo,Ind. C16 140
Minnequa,Colo. C10 143
Monessen,Pa. P7 138
Pittsburg,Calif. C11 157
Rankin,Pa. A7 138
SparrowsPt.,Md. B2 140
Sterling,Ill.(1) N15 138
Worcester,Mass. A7 144

FENCE POSTS

	Col.
ChicagoHts.,Ill. C2, I-2..	150
Duluth,Minn. A7	150
Franklin,Pa. F5	150
Johnstown,Pa. B2	150
Marion,O. P11	150
Minnequa,Colo. C10	155
Moline,Ill. R2	155
So.Chicago,Ill. R2	150
Tonawanda,N.Y. B12	150
Williamsport,Pa. S19 ...	150

BOLTS, NUTS

CARRIAGE, MACHINE BOLTS

(Base discounts, per cent off list, f.o.b. midwestern plants).

4 in. and shorter:
½-in. & smaller diam 2
Over 4 in. through 6 in.:
½ in. & smaller diam +3
6 in. and shorter:
⅞-in. and ⅝-in. .... +4
¾ in. and larger ... +6
Longer than 6 in.:
All diameters .....+15
Lag bolts, all diams.:
6 in. and shorter 6
Over 6 in. long ..... +2
Ribbed Necked Carriage +4
Blank 10
Plow 23
Step, Elevator, Tap and Sleigh Shoes 10
Tire Bolts ..... +3
Boiler & Fitting-Up Bolts 21

NUTS

H.P. and C.P., regular & heavy:
Square, all sizes 55
H.P., Hex, regular & heavy:
⅝" and smaller 55
⅞" to 1⅛", inclusive 58
1⅛" to 1½", inclusive 60
1⅝" and larger 55
C.P. Hex regular & heavy:
All sizes 55
Hot Galv. Nuts (all types):
⅝" or smaller 38
⅞" to 1½", inclusive 41
Finished Hex Nuts:
New standard, all sizes 55
Semifinished & Slotted Hex:
Regular and heavy, all sizes 55

SQUARE HEAD SET SCREWS

(1035 steel; packaged; per cent off list)
1 in. diam. x 6 in. and shorter 34
1 in. and smaller diam. x over 6 in. 20

HEADLESS SET SCREWS

(Packaged; per cent off list)
No. 10 and smaller 34
¼ in. diam. & larger .. 14
N.F. thread, all diams 8

STEEL STOVE BOLTS

(F.o.b. plant, per cent off list in packages)
Plain finish .....41—10
Plated finishes .....21—10

HEXAGON CAP SCREWS

(1020 steel; packaged; per cent off list)
6 in. or shorter:
¼-in. through ⅝-in. . 38
⅝-in. through 1 in. .. 15
Longer than 6 in.:
¼-in. through ⅝-in. . 20
⅝-in. through 1 in. .. 7

RIVETS

F.o.b. Cleveland, and/or freight equalized with Pittsburgh, f.o.b. Chicago, and/or freight equalized with Birmingham except where equalization is too great.
Structural ½-in., larger 9.25
7/8-in. under..List less 37%

WASHERS, WROUGHT

F.o.b. shipping point, to jobbers ..... List

BOILER TUBES

Net base c.l. prices, dollars per 100 ft, mill; minimum wall thickness, cut lengths 10 to 24 ft, inclusive.

O.D. In.	B.W. Gage	Seamless H.R.	Seamless C.D.	Elec. Weld H.R.
1	13	....	19.59	19.00
1¼	13	....	23.21	18.77
1½	13	21.40	25.65	20.75
1¾	13	25.28	30.31	24.52
2	13	28.33	33.97	27.48
2¼	13	31.91	38.26	30.95
2½	12	34.63	41.52	33.59
2½	12	38.15	45.74	37.00
2¾	12	41.31	49.53	40.07
3	12	44.05	52.82	42.73

RAILWAY MATERIALS

RAILS	Std. No. 1	Std. No. 2	Std. Toe Rails All No. 2	60 lb Under
Bessemer,Pa. U5	4.45	4.35	4.40	5.35
Ensley,Ala. T2	4.45	4.35	...	5.35
Fairfield,Ala. T2	...	...	...	5.35
Gary,Ind. U5	4.45	4.35	4.40	...
Huntington,W.Va. W7	...	...	...	5.35
IndianaHarbor,Ind. I-2 ...	4.45	4.35	4.40	...
Johnstown,Pa. B2	...	...	...(16)	5.35
Lackawanna,N.Y. B2	4.45	4.35	...	5.35
Minnequa,Colo. C10	4.45	4.35	...	5.85
Steelton,Pa. B2	4.45	4.35	...	5.35
Williampsort,Pa. S19	...	...	...	5.35

TIE PLATES

Fairfield,Ala. T2 .....5.275
Gary,Ind. U5 .....5.275
Ind.Harbor,Ind. I-2 ...5.275
Lackawanna,N.Y. B2..5.275
Minnequa,Colo. C10 ...5.275
Seattle B3 .....5.425
Steelton,Pa. B2 .....5.275
Torrance,Calif. C11 ...5.425

TRACK BOLTS (20) Treated

Cleveland R2 .....11.50
KansasCity,Mo. S5 ....11.50
Lebanon,Pa. B2 .....11.50
Minnequa,Colo. C10 ...11.50
Pittsburgh O3, P14 ...11.50
Seattle,Wash. B3 .....12.00

AXLES

Ind.Harbor,Ind. S13 ....6.75
Johnstown,Pa. B2 .....6.75

JOINT BARS

Bessemer,Pa. U5 .....5.425
Fairfield,Ala. T2 .....5.425
Ind.Harbor,Ind. I-2 ...5.425
Joliet,Ill. U5 .....5.425
Lackawanna,N.Y. B2..5.425
Minnequa,Colo. C10 ..5.425
Steelton,Pa. B2 .....5.425

SCREW SPIKES

Cleveland R2 .....11.00

STANDARD TRACK SPIKES

Fairfield,Ala. T2 .....7.30
Ind.Harbor,Ind. I-2 Y1 7.30
KansasCity,Mo. S5 ....7.30
Lebanon,Pa. B2 .....7.30
Minnequa,Colo. C10 ....7.30
Pittsburgh J5 .....7.30
Seattle B3 .....7.80
So.Chicago,Ill. R2 .....7.30
Struthers,O. Y1 .....7.30
Youngstown R2 .....7.30

METAL POWDERS

(Per pound, f.o.b. shipping point in ton lots for minus 100 mesh, except as otherwise noted)

Sponge iron: Cents
98+ % Fe, annealed. 15.25
Unannealed:
Minus 100 mesh.... 11.75
Minus 35 mesh.... 9.25
Minus 20 mesh.... 9.00
Swedish, c.l.f. N.Y., c.l., in bags 11.25
Domestic (Swedish), f.o.b. Riverton, N. J., in bags.... 9.50
Electrolytic iron:
Melting stock, 99.91% Fe, irregular fragments of ⅛ in. x 1.3 in. 22.00
Annealed, 99.5% Fe. 36.50
Unannealed (99+% Fe) 32.50
Unannealed (99+% Fe) (minus 325 mesh) 52.00
Powder Flakes (minus 16, plus 100 mesh).. 31.00
Carbonyl Iron:
97.9-99.8% size 5 to 10 microns—83.00-148.00
Aluminum:
Atomized, 500 lb drums, frgt, allowed:
Carlots 30.00
Ton lots 32.00
Antimony, 500 lb lots 32.00*
Brass, ¼-ton lots .....29.75-37.75†
Bronze, ¼-ton lots .....31.00-39.00†
Copper:
Electrolytic 13.75*
Reduced 13.75*
Lead 7.50*
Manganese:
Minus 35 mesh 61.00
Minus 100 mesh 67.00
Minus 200 mesh 72.00
Nickel, unannealed ... 89.50
Nickel-Silver, ¼-ton lots .....44.25‡
Nickel-Silver, ¼-ton lots 47.00**
Phosphor-Bronze, ¼-ton lots 58.50
Silicon 43.50
Solder 7.00*
Stainless Steel, 302 .. 91.00
Tin 14.50*
Zinc, ¼-ton lots, 17.25-31.00‡
Tungsten Dollars
Melting grade, 99% 60 to 200 mesh:
1000 lb and over.... 4.95
Less than 1000 lb .. 5.10
Chromium, electrolytic 99.2% Cr min. 3.50

*Plus cost of metal. †Depending on composition. ‡Depending on mesh. §70% Cu, 20% Zn, 10% Ni; **64% Cu, 18% Zn, 18% Ni.

Footnotes

(1) Chicago base.
(2) Angles, flats, bands.
(3) Merchant.
(4) Reinforcing.
(5) 1⅛" to 1 7/16"; 1 7/16" to 1 15/16" 4.78c; 1 15/16" to 7 5/16" 5.15c.
(6) Chicago or Birm. base.
(7) To jobbers, 3 cols. lower.
(8) 16 gage and heavier.
(9) 6 in. and narrower.
(10) Pittsburgh base.
(11) Cleveland & Pitts. base.
(12) Worcester, Mass., base.
(13) Add 0.25c for 17 Ga. & heavier.
(14) Gage 0.143 to 0.249 in.; for gage 0.142 and lighter, 5.80c.
(15) ⅜" and thinner.
(16) 40 lb and under.
(17) Flats only; 0.25 in. & heavier.
(18) To dealers.
(19) Chicago & Pitts. base.
(20) 0.25 off for untreated.
(21) New Haven, Conn., base.
(22) Del. San Francisco Bay area.
(23) 20 Ga. 36" wide.
(24) Deduct 0.10c, finer than 15 Ga.
(25) Bar mill bands.
(26) Reinforcing mill lengths, to fabricators; to consumers, 4.95c.
(27) Bar mill sizes.
(28) Bonderized.
(29) Youngstown base.
(30) Sheared; for universal mill add 0.45c for carbon and 0.35c H.S.-L.A.
(31) Widths over ⅝-in.; 6.40c for widths ⅝-in. and under by 0.125 in. and thinner.
(32) Buffalo base.
(33) To jobbers, deduct 20c.
(34) 9.60c for cut lengths.
(35) 72" and narrower.
(36) 54" and narrower.
(37) 13 gage & heavier; 60" & narrower.
(38) 14 gage & lighter.
(39) 48" and narrower.
(40) Lighter than 0.035"; 0.035" and heavier, 0.25c higher.
(41) 9.10c for cut lengths.
(42) Mill lengths, f.o.b. mill; deld. to mill zone or within switching limits, 5.10c.
(43) 9-14½ gage.
(48) 6-7 gage.

SEAMLESS STANDARD PIPE, Threaded and Coupled

Carload discounts from list, %

Size—Inches	2		2½		3		3½		4		5		6	
List Per Ft	37c		58.5c		76.5c		92c		$1.09		$1.48		$1.92	
Pounds Per Ft	3.68		5.82		7.62		9.20		10.89		14.81		19.18	
	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*
Aliquippa, Pa. J5	13.5	+3	17.5	+0.25	20	2.25	21.5	3.75	21.5	3.75	20.75	3	23.25	5.5
Ambridge, Pa. N2	13.5	...	17.5	...	20	...	21.5	...	21.5	...	20.75	...	23.25	...
Lorain, O. N3	13.5	+3	17.5	+0.25	20	2.25	21.5	3.75	21.5	3.75	20.75	3	23.25	5.5
Youngstown Y1	13.5	+3	17.5	+0.25	20	2.25	21.5	3.75	21.5	3.75	20.75	3	23.25	5.5

ELECTRIC WELD STANDARD PIPE, Threaded and Coupled

Carload discounts from list, %

Youngstown R2	13.5	+3	17.5	+0.25	20	2.25	21.5	3.75	21.5	3.75	20.75	3	23.25	5.5

BUTTWELD STANDARD PIPE, Threaded and Coupled

Carload discounts from list, %

Size—Inches	⅛		¼		⅜		½		¾		1		1¼	
List Per Ft	5.5c		6c		6c		8.5c		11.5c		17c		23c	
Pounds Per Ft	0.24		0.42		0.57		0.85		1.13		1.68		2.28	
	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*
Aliquippa, Pa. J5	...	...	....	....	....	....	23.75	6.5	26.75	10.5	29.25	14	31.75	15.25
Alton, Ill. L1	...	...	....	....	....	....	21.75	4.5	24.75	8.5	27.25	12	29.75	13.25
Benwood, W. Va. W10	24	+4.5	15.25	+10.25	7.25	+17.25	23.75	6.5	26.75	10.5	29.25	14	31.75	15.25
Butler, Pa. F6	25	+3.5	17	+8.5	9.5	+15	....	..	....	....	....	..	....	....
Etna, Pa. N2	...	...	....	....	....	....	23.75	6.5	26.75	10.5	29.25	14	31.75	15.25
Fairless, Pa. N3	...	...	....	....	....	....	21.75	4.5	24.75	8.5	27.25	12	29.75	13.25
Fontana, Calif. K1	...	...	....	....	....	....	10.75	+6.5	13.75	+2.5	16.25	1	18.75	2.25
Ind. Harbor, Ind. Y1	...	...	....	....	....	....	22.75	5.5	25.75	9.5	28.25	13	30.75	14.25
Lorain, O. N3	...	...	....	....	....	....	23.75	6.5	26.75	10.5	29.25	14	31.75	15.25
Sharon, Pa. B4	25	+3.5	17	+8.5	9.5	+15	....	..	....	....	....	..	....	....
Sharon, Pa. M6	...	...	....	....	....	....	23.75	6.5	26.75	10.5	29.25	14	31.75	15.25
Sparrows Pt., Md. B2	23	+5.5	15	+10.5	7.5	+17	21.75	4.5	24.75	8.5	27.25	12	29.75	13.25
Youngstown R2, Y1	...	...	....	....	....	....	23.75	6.5	26.75	10.5	29.25	14	31.75	15.25
Wheatland, Pa. W9	23	+5.5	15	+10.5	7.5	+17	23.75	6.5	26.75	10.5	29.25	14	31.75	15.25

Size—Inches	1½		2		2½		3		3½		4	
List Per Ft	27.5c		37c		58.5c		76.5c		92c		$1.09	
Pounds Per Ft	2.73		3.68		5.82		7.62		9.20		10.89	
	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*
Aliquippa, Pa. J5	32.25	16.25	32.75	16.75	34.25	17	34.25	17	....	...	....	...
Alton, Ill. L1	30.25	14.25	30.75	14.75	32.25	15	32.25	15	....	...	....	...
Benwood, W. Va. W10	32.25	16.25	32.75	16.75	34.25	17	34.25	17	25.5	7.75	25.5	7.75
Etna, Pa. N2	32.25	16.25	32.75	16.75	34.25	17	34.25	17	25.5	7.75	25.5	7.75
Fairless, Pa. N3	30.25	14.25	30.75	14.75	32.25	15	32.25	15	23.5	5.75	23.5	5.75
Fontana, Calif. K1	19.25	3.25	19.75	3.75	21.25	4	21.25	4	12.5	+5.25	12.5	+5.25
Ind. Harbor, Ind. Y1	31.25	15.25	31.75	15.75	33.25	16	33.25	16	24.5	6.75	25.5	6.75
Lorain, O. N3	32.25	16.25	32.75	16.75	34.25	17	34.25	17	....	...	....	...
Sharon, Pa. M6	13.25	16.25	32.75	16.75	34.25	17	34.25	17	....	...	....	...
Sparrows Pt., Md. B2	30.25	14.25	30.75	14.75	32.25	15	32.25	15	23.5	5.75	23.5	5.75
Youngstown R2, Y1	32.25	16.25	32.75	16.75	34.25	17	34.25	17	25.5	7.75	25.5	7.75
Wheatland, Pa. W9	32.25	16.25	32.75	16.75	34.25	17	34.25	17	25.5	7.75	25.5	7.75

*Galvanized pipe discounts based on current price of zinc (11.50c, East St. Louis).

Stainless Steel

(Representative prices, cents per pound; subject to current lists of extras)

AISI Type	Rerolling Ingots	Rerolling Slabs, Billets	Forging Billets	Seamless Tube Billets	H.R. Strip	Shapes; H.R. & C.F. Bars; Wire	Plates	Sheets	C.R. Strip; Flat Wire
301	16.25	20.50	29.50	34.25	29.75	35.25	37.25	41.25	38.25
302	17.25	22.75	29.75	34.50	32.00	35.50	37.50	41.50	41.50
302B	18.50	24.50	30.50	34.50	35.00	35.50	37.50	44.75	44.75
303	18.75	24.75	32.25	37.25	36.75	38.25	39.75	48.75	45.50
304	18.25	23.75	31.00	36.00	34.25	37.25	39.75	43.75	43.75
304L	....	....	36.00	41.00	39.25	42.25	44.75	48.75	48.75
306	19.50	25.50	....	36.25	37.00	37.50	42.00	51.75	46.75
308	19.75	26.25	35.25	40.75	38.00	42.00	46.00	48.00	48.00
309	26.50	34.75	42.75	49.25	49.25	50.50	53.75	62.00	62.00
309S	28.50	37.50	46.75	54.50	54.00	55.50	59.00	68.50	68.50
310	33.00	43.25	56.75	66.25	62.75	67.50	69.00	72.25	72.25
314	....	....	....	....	....	....	69.00	74.50	....
316	28.00	36.25	46.50	54.50	53.25	55.50	58.75	62.75	62.75
316L	....	....	51.50	59.50	58.25	60.50	63.75	67.75	67.75
317	33.00	43.50	57.25	66.75	67.50	68.25	70.75	77.00	77.00
318	33.50	44.00	55.25	64.50	66.25	65.50	68.75	80.25	80.25
321	22.75	29.50	35.25	40.75	41.00	42.00	45.75	50.50	50.50
330	....	....	58.00	....	....	68.50	70.00	73.75	77.75
347	31.00	41.00	45.00	56.00	56.50	52.75	57.50	65.50	65.50
348	....	....	53.75	....	....	63.25	68.25	76.50	76.50
403	....	....	27.00	30.75	....	32.00	34.25	44.00	41.25
405	16.50	21.75	25.25	29.25	30.50	30.25	31.75	39.75	39.75
410	14.00	18.25	24.00	27.75	26.25	28.75	30.00	34.25	34.25
416	....	....	24.50	28.25	....	29.25	30.50	41.25	41.25
420	22.00	28.50	29.25	34.00	35.50	35.00	38.50	52.75	52.75
430	14.25	18.50	24.50	28.25	27.00	29.25	30.50	34.75	34.75
430F	....	18.75	25.00	28.75	....	29.75	31.00	44.00	44.00
431	14.50	18.75	24.50	28.25	27.50	29.25	30.50	35.25	35.25
440A,B,C	....	28.50	29.25	34.00	....	35.00	38.50	49.25	52.75
442	....	....	28.00	....	....	30.50	35.25	48.25	47.75
446	....	....	33.50	38.25	50.25	39.50	40.75	59.75	59.75
501	....	....	14.00	14.50	21.25	16.00	18.25	29.00	29.00
502	....	....	15.25	16.00	22.25	17.00	20.00	30.00	30.00

Stainless Steel Producers Are: Allegheny Ludlum Steel Corp.; Alloy Metal Wire Co. Inc.; American Steel & Wire Div., U. S. Steel Corp.; Armco Steel Corp.; Babcock & Wilcox Co.; Bethlehem Steel Co.; J. Bishop & Co.; G. O. Carlson Inc.; Carpenter Steel Co.; Charter Wire Products Co.; Cold Metal Products Co.; Crucible Steel Co. of America; Damascus Tube Co.; Wilbur B. Driver Co.; Driver-Harris Co.; Eastern Stainless Steel Corp.; Ellwood Ivins Steel Tube Works Inc.; Firth Sterling Inc.; Ft. Wayne Metals Inc.; Globe Steel Tubes Co.; Helical Tube Co.; Indiana Steel & Wire Co.; Ingersoll Steel Div., Borg-Warner Corp.; Jessop Steel Co.; Johnson Steel & Wire Co. Inc.; Joslyn Mfg. & Supply Co.; Kenmore Metals Corp.; Maryland Fine & Specialty Wire Co.; McLouth Steel Corp.; Metal Forming Corp.; McInnes Steel Co.; National-Standard Co.; National Tube Div., U. S. Steel Corp.; Newman-Crosby Steel Co.; Pacific Tube Co.; Page Steel & Wire Div., American Chain & Cable Co. Inc.; Pittsburgh Rolling Mills Inc.; Republic Steel Corp.; Rodney Metals Inc.; Rome Mfg. Co.; Rotary Electric Steel Co.; Sharon Steel Corp.; Sawhill Tubular Products Inc.; Simonds Saw & Steel Co.; Specialty Wire Co. Inc.; Spencer Wire Corp.; Stainless Welded Products Inc.; Standard Tube Co.; Superior Steel Corp.; Superior Tube Co.; Timken Roller Bearing Co.; Trent Tube Co.; Tube Methods Inc.; Ulbrich Stainless Steels; United States Steel Corp.; Universal-Cyclops Steel Co.; Wallingford Steel Co.; Washington Steel Corp.

Clad Steel

	Plates, Carbon Base 10%	Plates, Carbon Base 20%	Sheets Carbon Base 20%
Stainless:			
302	....	31.00	31.00
304	27.60–28.10	32.50–33.20	32.50
310	36.50	41.00	....
316	32.60–33.10	37.70–42.75	42.75
318	37.00–37.50	42.20–42.70	....
321	29.36–29.80	34.40–37.00	37.00
347	30.40–30.90	35.50–40.50	40.50
405	23.40–23.90	30.60–31.10	....
410	22.00–23.40	30.10–30.60	....
430	23.40	30.60	....
Inconel	46.90	61.90	....
Nickel	38.30	51.70	....
Monel	39.70	52.66	....
Copper*	....	....	46.00

	Strip, Carbon Base: Cold-Rolled 10%	Cold-Rolled Both Sides	Hot-Rolled 10%	Hot-Rolled Both Sides
Copper*	28.85	35.85	25.00	32.25

*Deoxidized. Production points: Stainless-clad sheets, New Castle, Ind. I-4; stainless-clad plates, Claymont, Del. C22, Coatesville, Pa. L7, New Castle, Ind. I-4 and Washington, Pa. J3; nickel, inconel, monel-clad plates, Coatesville L7; copper-clad strip, Carnegie, Pa. S18.

Tool Steel

Grade	$ per lb	Grade	$ per lb
Regular Carbon	0.26	5% Cr Hot Work	0.405
Extra Carbon	0.31-.315	W-Cr Hot Work	0.425
Special Carbon	0.37	V-Cr Hot Work	0.445
Oil Hardening	0.405	Hi-Carbon-Cr	0.73

Grade by Analysis (%)

W	Cr	V	Co	Mo	$ per lb
20.25	4.25	1.6	12.25	...	4.030
18.25	4.25	1	4.75	...	2.245-2.415
18	4	2	9	...	2.615
18	4	2	....	...	1.705
18	4	1	....	...	1.540
14	4	2	5	...	2.185
13.75	3.75	2	5	...	2.185
13.5	4	3	....	...	1.805
9	3.5	..	....	...	1.115
6	4	2	....	5	1.045
6	4	3	....	6	1.290
1.5	4	1	....	8.5	0.900

Tool steel producers include: A4, A8, B2, B8, C4, C9, C13, C18, D4, F2, J3, L3, M14, S8, U4, V2 and V3.

Pig Iron

F.o.b. furnace prices in dollars per gross ton, as reported to STEEL. Minimum delivered prices are approximate and do not include 3% federal tax.

	Basic	No. 2 Foundry	Malleable	Bessemer
Birmingham District				
Birmingham R2	52.38	52.88	....	....
Birmingham U6	....	52.88	56.50†	....
Gadsden, Ala. R2	52.38	52.88	....	....
Woodward, Ala. W15	52.38	52.88	56.50†	....
Cincinnati, deld.	....	60.58	....	....
Buffalo District				
Buffalo R2	56.00	56.50	57.00	57.50
Buffalo H1	56.00	56.50	57.00	....
Tonawanda, N.Y. W12	56.00	56.50	57.00	....
No. Tonawanda, N.Y. T9	....	56.50	57.00	57.50
Boston, deld.	66.65	67.15	67.65	....
Rochester, N.Y., deld.	59.02	59.52	60.02	....
Syracuse, N.Y., deld.	60.12	60.62	61.12	....
Chicago District				
Chicago I-3	56.00	56.50	56.50	57.00
Chicago R2	56.00	....	56.50	....
Gary, Ind. U5	56.00	....	56.50	....
Indiana Harbor, Ind. I-2	56.00	....	56.50	....
So. Chicago, Ill. W14, Y1	56.00	56.50	56.50	....
So. Chicago, Ill. U5	56.00	....	56.50	57.00
Milwaukee, deld.	58.17	58.67	58.67	59.17
Muskegon, Mich., deld.	....	62.80	62.80	....
Cleveland District				
Cleveland A7	56.00	56.50	56.50	57.00
Cleveland R2	56.00	56.50	56.50	....
Akron, O., deld.	58.75	59.25	59.25	59.75
Lorain, O. N3	56.00	....	....	57.00
Mid-Atlantic District				
Bethlehem, Pa. B2	58.00	58.50	59.00	59.50
New York, deld.	....	62.28	62.78	....
Newark, deld.	61.02	61.52	62.02	62.52
Birdsboro, Pa. B10	58.00	58.50	....	....
Chester, Pa. C31	....	48.50	49.00	....
Philadelphia, deld.	....	50.16	50.66	....
Steelton, Pa. B2	58.00	58.50	59.00	59.50
Swedeland, Pa. A3	58.00	58.50	59.00	59.50
Philadelphia, deld.	59.66	....	....	....
Troy, N.Y. R2	58.00	58.50	59.00	59.50
Pittsburgh District				
Neville Island, Pa. P6	56.00	56.50	56.50	57.00
Pittsburgh (N&S sides), Aliquippa, deld.	....	57.87	57.87	58.37
McKeesRocks, deld.	....	57.54	57.54	58.04
Lawrenceville, Homestead, Wilmerding, Monaca, deld.	....	58.16	58.16	58.66
Verona, Trafford, deld.	58.19	58.69	58.69	59.19
Brackenridge, deld.	58.45	58.95	58.95	59.45
Bessemer, Pa. U5	56.00	....	56.50	57.00
Clairton, Rankin, So. Duquesne, Pa. U5	56.00	....	....	....
McKeesport, Pa. N3	56.00	....	....	57.00
Midland, Pa. C18	56.00	....	....	....
Monessen, Pa. P7	56.00	....	....	....

	Basic	No. 2 Foundry	Malleable	Bessemer
Youngstown District				
Hubbard, O. Y1	....	....	56.50	....
Sharpsville, Pa. S6	56.00	56.50	56.50	57.00
Youngstown Y1	....	....	56.50	57.00
Youngstown U5	56.00	....	....	57.00
Mansfield, O. deld.	60.90	....	61.40	61.90
Duluth I-3	56.00	56.50	56.50	57.00
Erie, Pa. I-3	56.00	56.50	56.50	57.00
Everett, Mass. E1	60.50	61.00	61.50	....
Fontana, Calif. K1	62.00	62.50	....	....
Geneva, Utah C11	56.00	56.50	....	....
Granite City, Ill. G4	57.90	58.40	58.90	....
Ironton, Utah C11	56.00	56.50	....	....
Lone Star, Texas L6	52.00	52.50*	52.50	....
Minnequa, Colo. C10	58.00	59.00	59.00	....
Rockwood, Tenn. T2	....	52.50*	56.50	....
Toledo, O. I-3	56.00	56.50	56.50	57.00
Cincinnati, deld.	61.76	62.26	....	....

*Low phos, southern grade. †Phos., 0.30 max.

PIG IRON DIFFERENTIALS

Silicon: Add 50 cents per ton for each 0.25% Si or percentage thereof over base grade, 1.75-2.25%, except on low phos iron on which base is 1.75-2.00%

Phosphorus: Deduct 38 cents per ton for P content of 0.70% and over.

Manganese: Add 50 cents per ton for each 0.50% manganese over 1% or portion thereof.

Nickel: Under 0.50% no extra; 0.50-0.74%, incl., add $2 per ton and each additional 0.25%, add $1 per ton.

BLAST FURNACE SILVERY PIG IRON, Gross Ton

(Base 6.0-6.50% silicon; add $1.00 for each 0.5% Si; 75 cents for each 0.5% Mn over 1%)

Jackson, O. G2, J1	$65.00
Buffalo H1	66.25

ELECTRIC FURNACE SILVERY PIG IRON, Gross Ton

(Base 14.01-14.50% silicon; add $1 for each 0.5% Si to 18%; $1 for each 0.5% Mn over 1%; $2 per gross ton premium for 0.045% max P)

Niagara Falls, N.Y. P15	$80.50
Keokuk, Iowa, Openhearth & Fdry, freight allowed K2	85.00
Keokuk, OH & Fdry, 12½ lb piglets, 16% Si, frgt allowed K2	88.00
Wenatchee, Wash. OH & Fdry, freight allowed K2	85.00

LOW PHOSPHORUS PIG IRON, Gross Ton

Cleveland, intermediate A7	$61.00
Rockwood, Tenn. T3	70.00
Steelton, Pa. B2	64.00
Philadelphia, deld.	67.55
Troy, N.Y. R2	64.00

Warehouse Steel Products

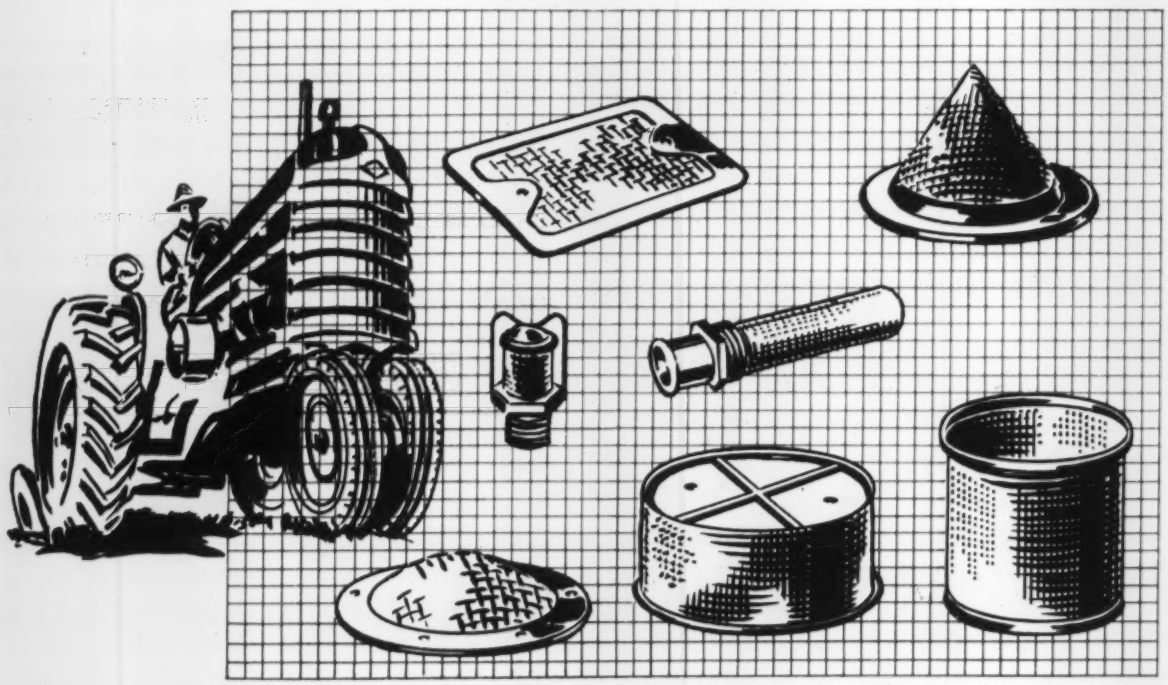
Representative prices, cents per pound, subject to extras, f.o.b. warehouse. City delivery charges are 20 cents per 100 lb except Birmingham and St. Paul, 15 cents; Philadelphia, New York, Boston and Los Angeles, 10 cents; Buffalo, 25 cents on C.R. and galvanized sheets, C.F. and alloy bars and 20 cents on other commodities; Houston, Seattle, Spokane, Wash., no charge.

	SHEETS				STRIP		BARS			Standard Structural Shapes	PLATES	
	Hot Rolled	Cold Rolled	Gal. 10 Ga.†	Stainless Type 302‡‡	H.R.*	C.R.*	H.R. Rds.	C.F. Rds.‡	H.R. Alloy 4140††‡		Carbon	Floor
Baltimore	6.02	7.51	7.79	....	6.69	...	6.68	8.52[4]	12.04	6.72	6.37	7.76
Birmingham	6.35	7.35	8.25[3]	....	6.60	...	6.50	9.10	....	6.65	6.65	8.45
Boston	7.23	8.23	9.52	44.78[9]	7.47	...	7.20	8.60	12.45	7.49	7.37	8.50
Buffalo	6.35	7.40	8.79	....	6.70	...	6.50	7.85	12.15	6.72	6.65	7.90
Charlotte, N. C.	6.95	7.80	8.69	....	6.90	...	7.10	8.37	....	7.10	7.10	8.37
Chicago	6.38	7.38	8.30	45.55	6.62	...	6.51	7.50	11.90	6.69	6.52	7.64
Cincinnati	6.49	7.37	8.30	45.80	6.86	...	6.75	7.80	12.15	6.86	6.81	7.89
Cleveland	6.38	7.38	8.45	45.66	6.72	...	6.57	7.60	11.96	7.02	6.69	7.81
Detroit	6.57	7.57	8.58	43.50	6.90	7.36	6.79	7.79	12.10	7.16	6.80	7.83
Erie, Pa.	6.35	7.38	8.30	....	6.70	...	6.50	7.45[4]	....	6.69	6.52	7.64
Houston	7.35	7.80	9.93	....	7.70	9.30	7.70	9.50	....	7.60	7.35	8.75
Los Angeles	7.40	9.25	9.85	50.15	7.75	11.75	7.35	10.05	13.20	7.55	7.35	9.45
Milwaukee	6.47	7.47	8.39	....	6.71	...	6.60	7.69	11.99	6.86	6.61	7.73
Moline, Ill.	6.73	7.73	8.65	....	6.97	...	6.86	7.85	....	7.04	6.87	...
New York	6.97	7.91	8.79	44.45	7.56	...	7.37	8.73[4]	12.28	7.38	7.27	8.68
Norfolk, Va.	7.00	...	...	....	7.10	...	7.10	8.60	....	7.10	7.10	7.95
Philadelphia	6.19	7.44	8.26	41.98[9]	6.96	8.80	6.74	8.36[4]	12.10	6.54	6.49	7.51**
Pittsburgh	6.38	7.38	8.30	45.50	6.72	...	6.51	7.85	11.90	6.69	6.52	7.64
Portland, Oreg.	7.60	8.75	9.35	48.50	7.85	...	7.55	10.95	14.00	7.50	7.45	9.35
Richmond, Va.	6.43	7.39	8.67	....	6.77	...	6.71	8.33	....	7.08	6.65	8.08
St. Louis	6.67	7.67	8.59	43.89	6.91	...	6.80	7.89	12.19	7.09	6.81	7.93
St. Paul	7.04	8.04	8.96	....	7.28	...	7.17	8.26	....	7.35	7.18	8.30
San Francisco	7.55	8.95	8.70	51.65	7.80	...	7.35	10.05	13.20	7.50	7.40	9.45
Seattle	8.10	9.80	10.15	50.50	8.20	...	7.80	10.95	13.65	7.75	7.80	9.60
Spokane	8.35	9.65[7]	10.05	....	7.80	...	7.80	10.85‡‡	14.40	7.45	7.55	9.60
Washington	6.70	7.99	7.97	....	7.37	...	7.38	9.09	....	7.31	7.05	8.16

*Prices do not include gage extras; †prices include gage and coating extras, based on 11-cent zinc except in New York, Philadelphia, Los Angeles, Cincinnati (11.50-cent zinc) and in Birmingham (coating extra excluded); ‡includes 35-cent special bar quality extra; §as rolled; **¼-in. and heavier; ††as annealed; ‡‡prices include $2 for crating; §§under ½-in.

Base quantities, 2000 to 4999 lb except as noted: Cold-rolled strip and cold-finished bars, 2000 lb and over, except in Seattle, 2000 to 9999 lb; stainless sheets, 8000 lb except in New York and Boston, 10,000 lb, and in San Francisco, 2000 to 4999 lb; hot-rolled products on West Coast, 2000 to 9999; [3]—500 to 9999 lb; [4]—4000 lb and over; [5]—1000 to 1999 lb; [6]—1000 lb and over; [7]—1500 lb to 3999 lb; [9]—f.o.b. local delivery in lots of 10,000 lb and over.

THIS WAY *dependability* OF PRODUCT PERFORMANCE IS *screened in*



Farm machinery must keep on keeping-on. From sewing seed to harvesting crops—everything must be done when the time is *right.*

That's why the wire screen cloth that does its job so unfailingly in so many small but vital farm machinery parts *is* important.

In the farm tractors' spark arresters, radiator grilles, brake linings, air cleaners and in all the various filters and screens using Reynolds wire cloth—failures are screened out and dependability is *screened in.*

From the fanning mills that sift and size the seed to the self-propelled harvesters—farm machinery makers know that they can rely on Reynolds to meet specifications precisely. For details see Sweet's Product Design File.

Consult Reynolds Engineers . . . no cost . . . no obligation.

Reynolds WIRE for Industry

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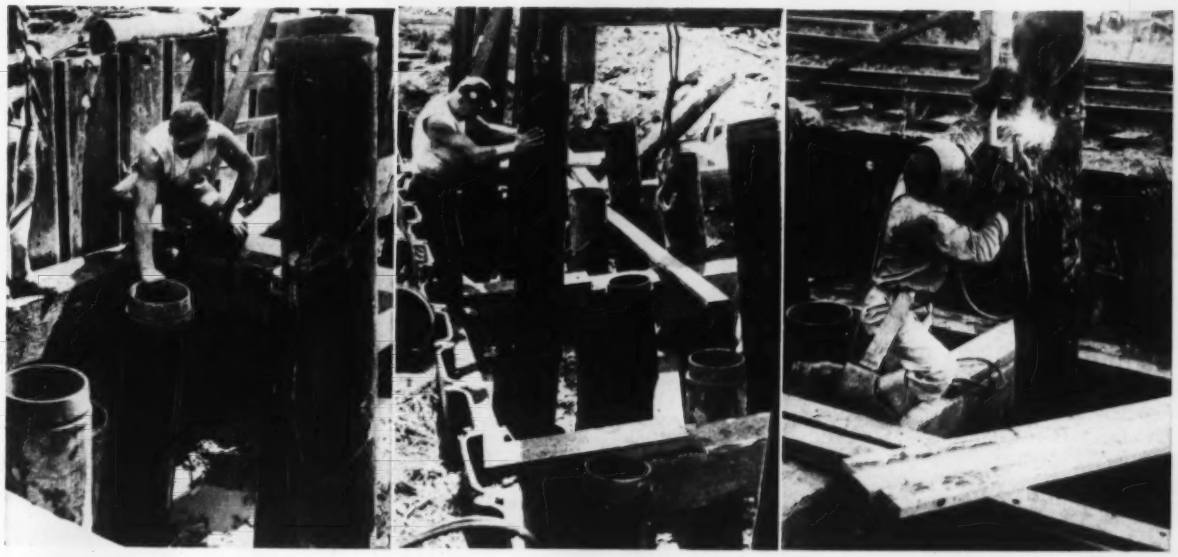
REYNOLDS WIRE DIVISION, NATIONAL-STANDARD CO., Box 300, **DIXON, ILL.**

Divisions of National-Standard Co.

ATHENIA STEEL...*Clifton, N. J.*	Flat, High Carbon, Cold Rolled Spring Steel
NATIONAL-STANDARD...*Niles, Mich.*	Tire Wire, Fabricated Braids and Tape
WAGNER LITHO MACHINERY...*Jersey City, N. J.*	Metal Decorating Equipment
WORCESTER WIRE WORKS...*Worcester, Mass.*	Round and Shaped Steel Wire, Small Sizes



Taylor Forge & Pipe Works

An insert is fitted to one section . . . A second section is lowered in place . . . And a welder draws a bead on . . .

Spiralweld Pipe: It Grows with New Uses

Omnipresent construction may open wide market for foundation pipe. Industry needs intensive selling to gain acceptance of its product for this application. But prospects seem to be good

THE CONSTRUCTION BOOM may not be everything to everybody, but to producers of spiralweld pipe, it could well mean a considerable expansion of a growth industry.

Since the beginning of the industry about 50 years ago, the primary uses of spiralweld pipe have been for low-pressure applications such as gas piping, for irrigation projects, waterworks and underground ventilation. About 10 years ago, it made its entry into the construction field, and its use there has been growing ever since.

Good Foundation—One of the most recent developments is in foundation piling for bridges and buildings. With the increased tempo of superhighway building, this opens a vast new market. For instance, in early October, 90-foot sections of spiralweld pipe made by Taylor Forge & Pipe Works were driven to depths ranging between 20 and 134 feet for the foundation of one of five land bridges at Chester, N. Y. The project is part of the new expressway leading to the New York Thruway.

Taylor officials say they have been experimenting with this type construction since 1949. They anticipate an intensive sales campaign will be needed by the industry to overcome the natural resistance to new methods, but if this pipe gains acceptance by contractors, it will substantially increase the industry's sales.

Big Three—Three producers use three different processes to make the pipe. Taylor, at Carnegie, Pa., and Fontana, Calif., makes lapweld; Armco Steel Corp. makes buttweld at Middletown, O.; Naylar Pipe Co., Chicago, makes lockseam. Together they account for a capacity of 171,000 tons a year, according to 1954 figures of American Iron & Steel Institute. That's an increase of 11.8 per cent over the institute's figures of 1951, most of which has come about because of new uses. That capacity should grow over the next few years if expectations of producers are realized. They are unanimous in agreeing that the future of the industry is just about unlimited.

Immediate business prospects are pretty good. Production has been spotty this year, at times taxing the capacity of the equipment and at other times being practically nonexistent. As a whole, however, 1954 will be off just a little from last year. Next year should see some pickup in activity, especially if the industry increases its share of the construction market.

Plates . . .

Plate Prices, Page 138

Platemakers see no particular demand improvement in sight this year. Despite the current sluggishness, longer-term prospects are brightened by signs of a pickup in freight car orders. These are expected to bolster plate mill operations next quarter.

In the East, mill operations have been far from brisk for months. Along with continued lag in ship and railroad work, there is little fabricated line pipe demand. Reports

from the South and Midwest indicate this kind of work is tapering off rapidly.

Some major projects, including notably the 450,000-ton line from Houston, Tex., to Newark, N. J., are still in prospect, but they are slow coming to a head.

Another big consuming area, construction, is experiencing a seasonal decline; this is being reflected in shrinking plate orders as fabricators trim inventories.

Tubular Goods . . .

Tubular Goods Prices, Page 142

Buttweld and seamless pipe sales are increasing. Mills are not operating at capacity, but their shipments generally are reported at least 10 per cent above those in October. Tubemakers report the warehouses are increasing their orders and that virtually all classes of buyers are noticeably inventory-conscious.

Two items not sharing in the noticeable improvement in sales are seamless specialties and seamless oil country goods. Specialties are in fair demand, but oil country goods appear to be held down by inventory cutbacks. Users are limiting yearend stocks.

Reports from the Pacific Northwest indicate cast iron pipe is moving sluggishly.

Jones & Laughlin Steel Corp., Pittsburgh, has started operations at its new seamless tube finishing facilities at Aliquippa Works.

Deliveries of standard line pipe—4 to 12-in.—are into the first quarter in the Chicago district. Sizes 12 to 14-in., however, can be had in three to four weeks.

October Steel Output Rises

Steel production in October rose to the highest level since January, reports the American Iron & Steel Institute.

Output of ingots and steel for castings in the month amounted to 7,702,000 net tons, an increase of 894,517 tons, compared with September production of 6,807,483 tons. In October, 1953, output totaled 9,462,722 tons.

Weekly production during October showed an increase of 148,000 tons over that of September. The increase from August to September was 86,000 tons, from July to August, 5000 tons.

The index of production in October stood at 108.3 (1947-49 equals 100), against 98.9 the preceding month. In February it stood at 110.2, January, 111.8.

Output during the month was at 72.9 per cent of ingot capacity against 66.7 in September, bringing the 10-month rate to 69.5 per cent. Annual capacity at the beginning of this year was 124.3 million net tons, compared with 117.5 million at the beginning of 1953.

Cumulative production in the first 10 months of this year was 71,935,619 net tons. This is a decline of 23,037,720 tons, or about 24 per cent, compared with output of 94,973,339 tons in the first 10 months of 1953.

Sheets, Strip . . .

Sheet & Strip Prices, Pages 139 & 140

Pressure on the sheet mills is mounting. The current surge in demand is being felt over virtually the entire range of light, flat-rolled products.

Cold-rolled and galvanized sheets are under greatest demand pressure, but hot-rolled sheets and strip and enameling sheets are receiving increasing attention of consumers as deliveries become further extended and some signs of scare buying appear.

In the East cold-rolled deliveries run six to seven weeks on the average. Even though longer time is required in some cases, some tonnage can still be picked up a shade under six weeks. One eastern producer of cold-rolled is operating at capacity for the first time in months. Pittsburgh mills are operating near capacity and booking into the first quarter.

Chicago district mills report hot-rolled sheets and strip are beginning to tighten up, though still far behind cold-rolled and galvanized which are virtually sold out for the first quarter. One area mill which has been able to supply hot-rolled in two to three weeks, now requires three to four.

Swelling demand for hot and cold-rolled reflects chiefly automotive requirements. But diversified manufacturing is ordering more actively, some orders from this area of consumption being of a "scare" or "protective" nature as mill deliveries

Period	OPEN HEARTH Net tons	OPEN HEARTH Per cent of capacity	OPEN HEARTH ‡Index	BESSEMER Net tons	BESSEMER Per cent of capacity	BESSEMER ‡Index	ELECTRIC Net tons	ELECTRIC Per cent of capacity	ELECTRIC ‡Index	TOTAL Net tons	TOTAL Per cent of capacity	TOTAL ‡Index	Calculated weekly production (Net tons)	Number of weeks in month
1954														
January	7,256,526	78.3	113.3	260,453	64.0	74.1	434,507	48.9	121.7	7,951,486	75.3	111.8	1,794,918	4.43
February	6,523,213	77.9	112.8	174,253	47.4	54.9	385,771	48.1	119.6	7,083,237	74.3	110.2	1,770,809	4.00
March	6,649,667	71.7	103.8	207,726	51.1	59.1	432,207	48.7	121.0	7,289,600	69.0	102.5	1,645,508	4.43
1st Qtr.	20,429,406	75.9	109.9	642,432	54.4	63.0	1,252,485	48.6	120.8	22,324,323	72.8	108.1	1,735,950	12.86
April	6,365,326	70.9	102.7	162,657	41.3	47.8	442,954	51.5	128.2	6,970,937	68.1	101.3	1,624,927	4.29
May	6,817,951	73.6	106.4	198,063	48.7	56.4	456,724	51.4	127.9	7,472,738	70.7	105.0	1,686,848	4.43
June	6,702,006	74.7	108.1	207,666	52.7	61.1	453,962	52.8	131.3	7,363,634	72.0	107.0	1,716,465	4.29
2nd Qtr.	19,885,283	73.1	105.8	568,386	47.6	55.1	1,353,640	51.9	129.1	21,807,309	70.3	104.4	1,676,196	13.01
1st Half	40,314,689	74.5	107.8	1,210,818	51.0	59.0	2,606,125	50.3	125.0	44,131,632	71.5	106.2	1,705,900	25.87
July	6,040,120	65.3	94.3	205,3131	50.6	58.4	382,164	43.1	107.0	6,627,597	62.9	93.2	1,499,456	4.42
Aug.	6,021,496	65.0	94.0	217,837	53.6	62.0	427,574	48.2	119.7	6,666,907	63.1	93.7	1,504,945	4.43
*Sept.	6,140,266	68.6	99.1	214,065	54.5	63.0	453,152	52.8	131.1	6,807,483	66.7	98.9	1,590,533	4.28
*3rd Qtr.	18,201,882	66.3	95.8	637,215	52.9	61.1	1,262,890	48.0	119.1	20,101,987	64.2	95.2	1,530,997	13.13
*9 Mo.	58,516,571	71.7	103.7	1,848,033	51.6	59.7	3,869,015	49.5	123.0	64,233,619	69.1	102.5	1,647,016	39.00
†Oct.	6,969,000	75.2	108.8	238,000	58.5	67.7	495,000	55.8	138.6	7,702,000	72.9	108.3	1,739,000	4.43
1953														
January	8,841,679	101.4	138.0	350,200	88.9	99.7	706,083	81.2	197.7	9,897,962	99.1	139.1	2,234,303	4.43
February	7,939,299	100.8	137.2	329,389	92.6	103.8	664,091	84.6	205.9	8,932,779	99.1	139.0	2,233,195	4.00
March	9,050,773	103.7	141.3	354,710	90.0	101.0	762,615	87.7	213.5	10,168,098	101.8	142.9	2,295,282	4.43
1st Qtr.	25,831,751	102.0	138.9	1,034,299	90.4	101.4	2,132,789	84.5	205.7	28,998,839	100.0	140.4	2,254,964	12.86
April	8,493,909	100.5	137.0	334,605	87.7	98.4	717,024	85.2	207.4	9,545,538	98.7	138.7	2,225,067	4.29
May	8,925,163	102.3	139.3	354,577	90.0	100.9	717,340	82.5	200.8	9,997,080	100.1	140.5	2,256,677	4.43
June	8,394,502	99.4	135.4	332,060	87.0	97.7	677,917	80.5	196.1	9,404,479	97.2	136.6	2,192,186	4.29
2nd Qtr.	25,813,574	100.8	137.3	1,021,242	88.3	99.0	2,112,281	82.7	201.5	28,947,097	98.7	138.6	2,224,988	13.01
1st Half	51,645,325	101.4	138.1	2,055,541	89.3	100.2	4,245,070	83.6	203.6	57,945,936	99.4	139.5	2,239,889	25.87
July	8,316,342	95.5	129.8	324,068	82.4	92.2	635,263	73.2	177.9	9,275,673	93.1	130.4	2,098,569	4.42
Aug.	8,463,155	97.0	132.1	310,074	78.7	88.2	632,351	72.7	177.0	9,405,580	94.2	132.2	2,123,156	4.43
Sept.	8,076,277	95.8	130.3	287,638	75.6	84.6	519,513	61.9	150.3	8,883,428	92.1	129.0	2,075,567	4.28
3rd Qtr.	24,855,774	96.1	130.8	921,780	78.9	88.4	1,787,127	69.4	168.6	27,564,681	93.1	130.6	2,099,366	13.13
9 Mos.	76,501,099	99.6	135.6	2,977,321	85.8	96.2	6,032,197	78.8	191.8	85,510,617	97.3	136.5	2,192,580	39.00
Oct.	8,648,428	99.1	135.0	325,250	82.6	92.6	489,044	56.3	136.9	9,462,722	94.7	133.0	2,136,055	4.43

Note—The percentages of capacity operated are calculated on weekly capacities in 1954 of 2,092,342 net tons open hearth, 91,810 net tons bessemer and 200,397 net tons electric ingots and steel for castings, total 2,384,549 net tons; based on annual capacities as of Jan. 1, 1954 as follows: Open hearth 109,094,730 net tons, bessemer 4,787,000 net tons, electric 10,448,680 net tons, total 124,330,410 net tons.

Note—The percentages of capacity operated are calculated on weekly capacities in 1953 of 1,969,275 net tons open hearth, 88,934 net tons bessemer and 196,250 net tons electric ingots and steel for castings, total 2,254,459 net tons; based on annual capacities as of Jan. 1, 1953 as follows: Open hearth 102,677,980 net tons, bessemer 4,637,000 net tons, electric 10,232,190 net tons, total 117,547,470 net tons.

*Revised. †Preliminary figures, subject to revision. ‡Index of production based on average weekly production of the three years 1947-1948-1949.

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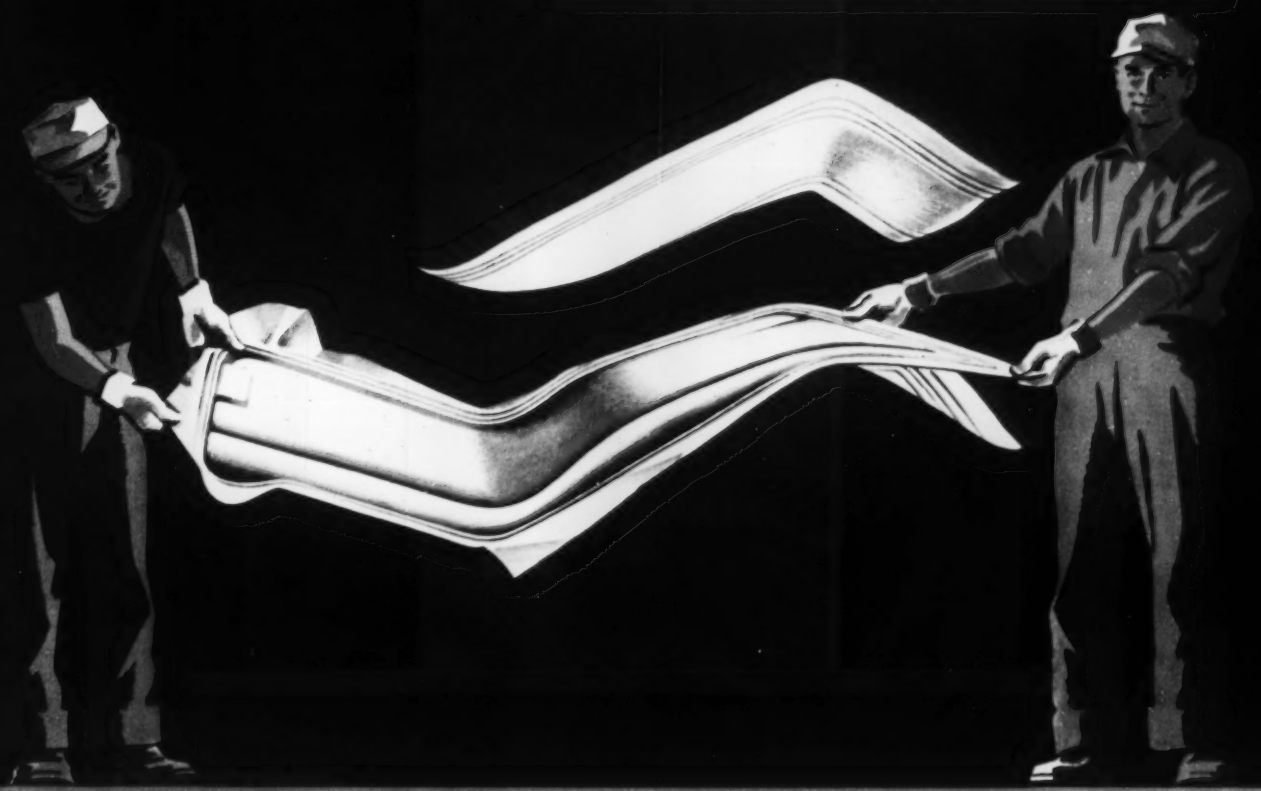

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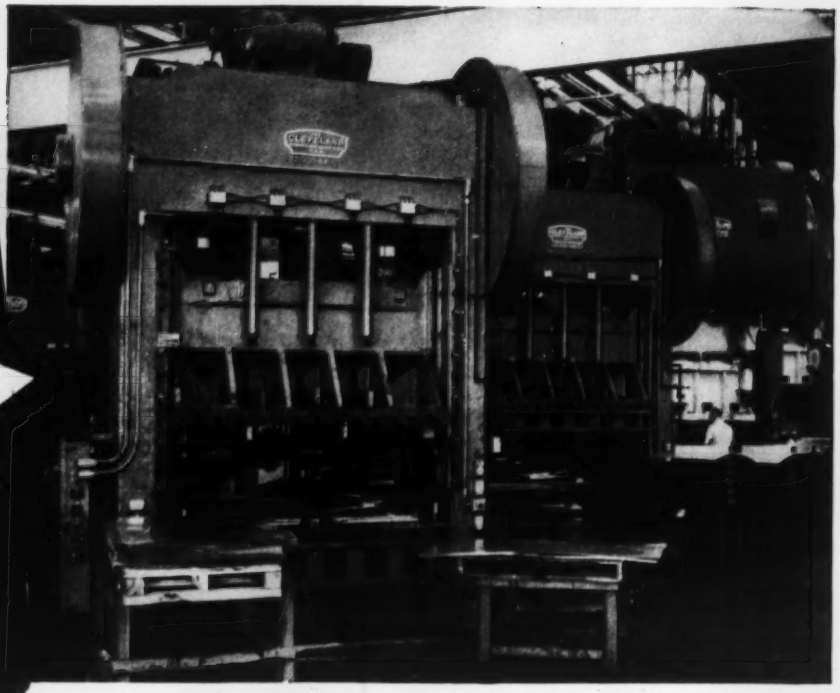

Photos courtesy General Electric Company.

Last year 15 new Cleveland Presses were installed at Appliance Park, Louisville, Kentucky, General Electric's new major appliance center. These presses produce parts for the famous General Electric ranges.

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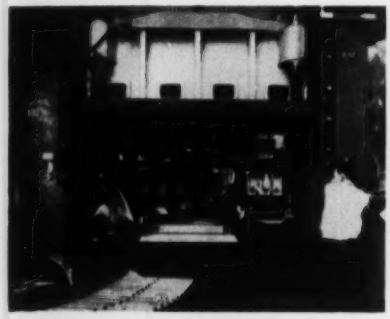

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steadily push into the future. In New England enameling sheets have tightened up almost as much as cold-rolled and galvanized. Heavier requirements for appliances are supplemented by new applications, including high temperature uses for ceramic-coated stock.

Demand for galvanized sheets continues exceptionally strong. Deliveries are by far the most extended of all the flat-rolled items. Most promises on the continuous-dipped grade run into second quarter of next year. On the noncontinuous grade in the lighter gages, shipments extend into late first quarter. One eastern maker is quoting 16 weeks on 18 gage and lighter, 10 weeks on heavier.

For delivery to the Brooklyn naval shipyard, Navy General Stores Office, Philadelphia, closes Nov. 22 on 100 tons of galvanized sheets and Nov. 29 on 100 tons of black sheets; also 1565 tons of steel strapping, east and west yards, Nov. 26. Raritan arsenal, N. J., closes Nov. 23, on 575 tons of carbon sheets.

Steel Bars . . .

Bar Prices, Page 138

Reflecting the strong automotive situation and a modest pickup in farm equipment and general manufacturing, orders for carbon steel bars (hot-rolled and cold-finished) are going upward modestly. But production capacity far exceeds current demand so that deliveries continue in the range of two to four weeks.

In the eastern market demand is a shade better than it was recently but it is still described as far from brisk. But orders are diversified, with little outstanding in any one direction. Automotive requirements are not as prominent in district demand as they are at Cleveland and Chicago.

Sales gains continue to be reported at Pittsburgh. Demand isn't restricted to automotive requirements. General industrial needs for cold-finished bars are reported 10 per cent above October volume and 40 per cent above that of midsummer.

An exception to the generally stronger tone in the bar market, rail steel bars at Chicago show signs of easing. Deliveries now are available in 10 days to two weeks compared with recent promises of two to three weeks.

Small arms contracts account for the steady demand of bars in New England, notably alloys, on a long term basis. Otherwise, alloy requirements show only slight improvement. The Springfield, Mass., armory has

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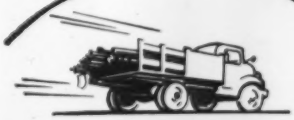

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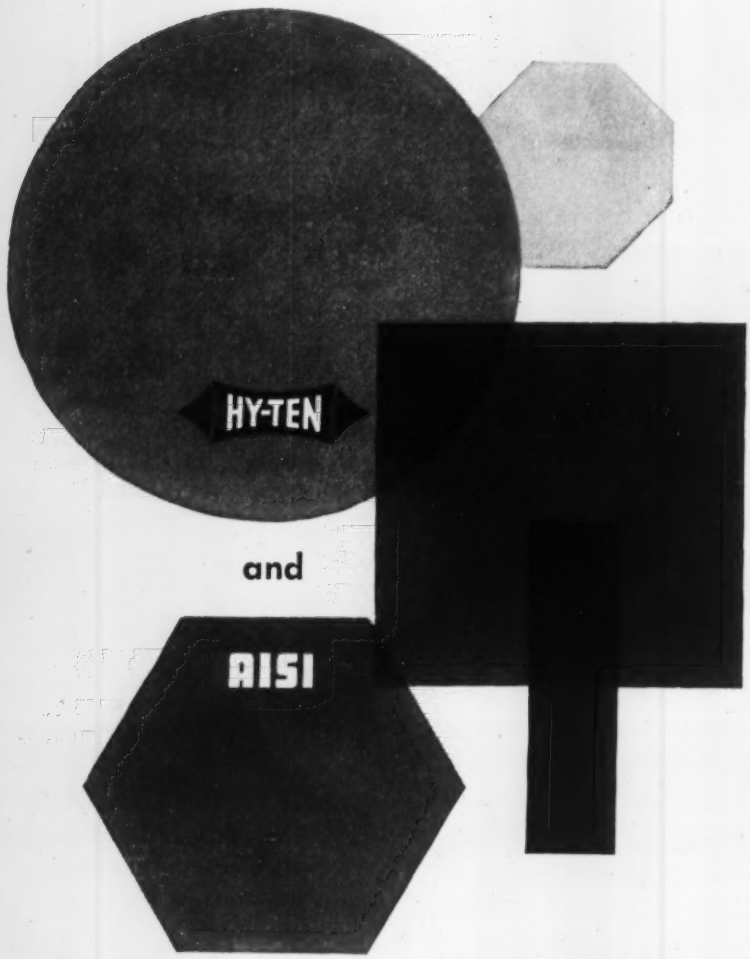

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estimates on 715 tons, largest item being 420 tons of 1 22/32-in. squares with rounded corners, as rolled.

Rails, Cars . . .

Track Material Prices, Page 141

Seaboard Air Line railroad placed orders for 1000 freight cars, costing $6,680,000. Included are 500 fifty-ft, fifty-ton box cars from ACF Industries Inc., St. Louis; 400 forty-ft, fifty-ton box cars from Pullman-Standard Car Mfg. Co., Bessemer, Ala.; and 10 seventy-ton phosphate rock cars from Bethlehem Steel Co., Johnstown, Pa.

Structural Shapes . . .

Structural Shape Prices, Page 138

Structural market activity is leveling off seasonally as weather conditions become less favorable for building and budgets for public works begin to expire.

Construction firms are trimming inventories in preparation for the seasonal slowdown normally experienced in December and January.

U. S. Steel Corp.'s American Bridge Division will expand operations at Ambridge, Pa. The division will transfer equipment from the corporation's Youngstown works to Ambridge for production of "I-Beam-Lok" light-weight bridge flooring, which had been made in Youngstown since 1944.

British Columbia officials are studying completed plans for a proposed $10 million bridge system at Vancouver, B. C. It will connect Marpole and Sea Island.

Prices on fabricated structural steel are highly competitive in New England. For bridges, quotations are usually under engineer's estimates and more bids per project are received, an average of 9 compared with 6.6 per federal-aid project in 1953.

STRUCTURAL SHAPES . . .

STRUCTURAL STEEL PLACED

3200 tons, brewery, Carling Co. of Cleveland, Natick, Mass., to Ingalls Iron Works, Birmingham, Ala.; Gilbane Building Co., Providence, R. I., general contractor.

3000 tons, refinery project, Shell Oil Co., Anacortes, Wash., to Isaacson Iron Works, Seattle; Bechtel Co., San Francisco, general contractor.

1730 tons, state road work, contract 53-3, Bronx county, New York, through Fehlhaber Corp., general contractor, to Bethlehem Steel Co., Bethlehem, Pa.

1455 tons, two apartments, 56th St. and Lexington Ave., New York, through H. Weisner & Sons, to Grand Iron Works, that city.

1000 tons, office, Tishman Realty & Construction Co., Los Angeles, to Union Steel Co.

530 tons, buildings, Delaware Institutional District, Lima, Pa., to Grays Metal Works, Philadelphia.

250 tons, plant building, DuPont interests, Parkersburg, W. Va., to Ingalls Iron Works Co., Birmingham, Ala.

240 tons, buildings, 34 and 52, Linde Air Prod-

(*Please turn to page* 154)

"...business helps itself by promoting thrift among its own people."

EDWARD C. BALTZ
President
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"Expanding the regular sales of U. S. Savings Bonds is essential to the continued success of our Government's sound money policy. Savings Bonds help people build security for themselves and stability for the nation's economy. A reserve in Bonds gives them the assurance to spend current income on homes, cars and other substantial purchases. Meanwhile, regular Bond buying goes on adding to their future buying power. Thus business helps itself by promoting thrift among its own people. The surest way to encourage an employee to save regularly right where he works is to sign him up on the Payroll Savings Plan."

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- currently, more than 45,000 companies, large and small, representing every classification of industry and business, are encouraging national thrift through the Payroll Savings Plan.
- every month, 8,500,000 Payroll Savers in these 45,000 companies invest more than $160,000,000 in Savings Bonds.
- largely as the result of employer-encouraged thrift the cash value of Savings Bonds held by individuals on July 31, 1954, totaled more than 37.5 billion dollars.
- never before has America had such a reserve of future purchasing power.
- invested in America, these 37.5 billion dollars in Savings Bonds Dollars are a most effective check on inflation and a very important contribution to economic stability and a sound dollar.

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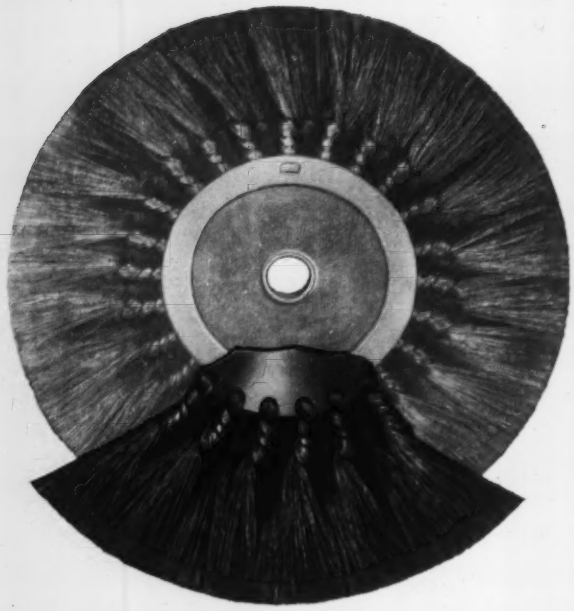

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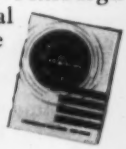

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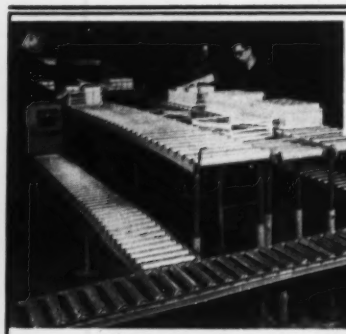

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(16 to 19% Mn) $84 per ton, Palmerton, Pa.; $85 per ton, Clairton and Duquesne, Pa.

Standard Ferromanganese: (Mn 74-76%, C 7% approx.). Base price per net ton $190, Clairton, Duquesne, Johnstown and Sheridan, Pa.; Alloy, W. Va.; Ashtabula, Marietta, Philo, O.; Sheffield, Ala.; Portland, Oreg., and Tacoma, Wash. Add or subtract $2.00 for each 1% or fraction thereof of contained manganese over 76% or under 74%, respectively.

(Mn 79-81%) Lump $198 per net ton, f.o.b. Anaconda or Great Falls, Mont. Add $2.60 for each 1% above 81%; subtract $2.60 for each 1% below 76%, fractions in proportion to nearest 0.1%.

Low-Carbon Ferromanganese, Regular Grade: (Mn 85-90%). Carload, lump, bulk, max, 0.07% C, 29.95c per lb of contained Mn, carload packed 30.7c, ton lots 31.8c, less ton 33c. Delivered. Deduct 1.5c for max 0.15% C grade from above prices 3c for max, 0.30% C, 3.5c for max 0.50% C, and 6.5c for max 75% C—max 7% Si. **Special Grade:** (Mn 90% min, C 0.07% max, P 0.06% max). Add 2.05c to the above prices. Spot, add 0.25c.

Medium-Carbon Ferromanganese: (Mn 80-85%, C 1.5% max). Carload, lump, bulk 21.35c per lb of contained Mn, carload packed 22.1c, ton lot 23.2c, less ton 24.4c. Delivered. Spot, add 0.25c.

Manganese metal: 2" x D (Mn 95.5% min, Fe 2% max, Si 1% max, C 0.2% max): Carload, lump, bulk, 45c per lb of metal; packed, 45.75c; ton lot 47.25c; less ton lots 49.25c. Delivered. Spot, add 2c.

Electromanganese: Min carloads, 30c; 2000 lb to min carloads, 32c; 250 lb to 1999 lb 34c. Premium for hydrogen-removed metal, 0.75c per lb. Prices are f.o.b. cars, Knoxville, Tenn., freight allowed to St. Louis or to any point east of Mississippi.

Silicomanganese: (Mn 65-85%). Contract, lump, bulk, 1.50% C grade, 18-20% Si, 11.00c per lb of alloy, carload packed, 11.75c, ton lots 12.65c, less ton 13.65c. Freight allowed. For 2% C grade, Si 15-17%, deduct 0.2c from above prices. For 3% C grade, Si 12-14.5%, deduct 0.4c from above prices. Spot, add 0.25c.

TITANIUM ALLOYS

Ferrotitanium, Low-Carbon: (Ti 20-25%, Al 3.5% max, Si 4% max, C 0.10% max). Contract, ton lots 2" x D, $1.50 per lb of contained Ti; less ton $1.55. (Ti 38-43%, Al 8% max, Si 4% max, C 0.10% max). Ton lots $1.35, less ton $1.37, f.o.b. Niagara Falls, N. Y., freight allowed to St. Louis. Spot, add 5c.

Ferrotitanium, High-Carbon: (Ti 15-18%, C 6-8%). Contract $177 per ton, f.o.b. Niagara Falls, N. Y., freight allowed to destinations east of Mississippi river and north of Baltimore and St. Louis.

Ferrotitanium, Medium-Carbon: (Ti 17-21%, C 2-4.5%). Contract $195 per ton, f.o.b. Niagara Falls, N. Y., freight not exceeding St. Louis rate allowed.

CHROMIUM ALLOYS

High-Carbon Ferrochrome: Contract, c.l., lump, bulk 24.75c per lb of contained Cr; c.l. packed 25.65c, ton lot 26.80c, less ton 28.20c. Delivered. Spot, add 0.25c.

Low-Carbon Ferrochrome: (Cr 67-72%). Contract, carload, lump, bulk, max, 0.025% C (Simplex) 34.50c per lb contained Cr, 0.03% C 36.50c, 0.04% C 35.50c, 0.06% C 34.50c, 0.10% C 34.00c, 0.15% C 33.75c, 0.20% C 33.50c, 0.50% C 33.25c, 1% C 33.00c, 1.50% C 32.85c, 2% C 32.75c. Carload packed add 1.1c, ton lot 2.2c, less ton add 3.9c. Delivered. Spot, add 0.25c.

Foundry Ferrochrome, High-Carbon: (Cr 62-66%, C 5-7%). Contract, c.l. 8 M x D, bulk, 26.25c per lb contained Cr. Packed, c.l. 27.15c, ton 28.50c, less ton 30.25c. Delivered. Spot, add 0.25c.

Foundry Ferrochrome, Low-Carbon: (Cr 50-54%, Si 28-32%, C 1.25% max). Contract, carload, packed, 8 M x D, 18.35c per lb of alloy; ton lot 19.2c; less ton lot, 20.4c, delivered; spot, add 0.25c.

Low-Carbon Ferrochrome Silicon: (Cr 34-41%, Si 42-49%, C 0.05% max). Contract, carload, lump, 4" x down and 2" x down, bulk, 24.75c per lb of contained chromium plus 12c per pound of contained silicon; 1" x down, bulk 24.90c per pound of contained chromium plus 12.2c per pound of contained silicon. F.o.b. plant; freight allowed to destination.

Chromium Metal: (Min 97% Cr and 1% Fe). Contract, 1" x D; packed, max 0.50%, carload $1.16, ton lots $1.18; less ton $1.20. Delivered. Spot, add 5c. Prices on 0.10 per cent carbon grade, add 9c to above prices.

VANADIUM ALLOYS

Ferrovanadium: Open-hearth Grade (V 35-55%, Si 8-12% max, C 3-3.5% max). Contract, any quantity, $3.00 per lb of contained V. Delivered. Spot, add 10c. **Crucible-Special Grades** (V 50-55%, Si 2-3.5% max, C 0.5-1% max). $3.10. **Primos and High Speed Grades** (V 50-55%, Si 1.50% max, C 0.20% max) $3.20.

Grainal: Vanadium Grainal No. 1, $1 per lb; No. 6, 68c; No. 79, 50c, freight allowed.

Vanadium Oxide: Contract, less carload lots $1.28 per lb contained V_2O_5, freight allowed. Spot, add 5c.

SILICON ALLOYS

25-30% Ferrosilicon: Contract, carload, lump, bulk, 20.0c per lb of contained Si, packed 21.40c; ton lot 22.50c f.o.b. Niagara Falls, freight not exceeding St. Louis rate allowed.

50% Ferrosilicon: Contract, carload, lump, bulk, 12c per lb of contained Si, carload packed 13.6c, ton lot 15.05c, less ton 16.7c. Delivered. Spot, add 0.45c.

Low-Aluminum 50% Ferrosilicon: (Al 0.40% max). Add 1.7c to 50% ferrosilicon prices.

65% Ferrosilicon: Contract, carload, lump, bulk, 13.5c per pound contained silicon; carload packed 14.85c; ton lots, 16.05c; less ton, 17.4c, delivered. Spot, add 0.35c.

75% Ferrosilicon: Contract, carload, lump, bulk, 14.4c per lb of contained Si, carload packed 15.7c, ton lot 16.85c, less ton 18.1c. Delivered. Spot, add 0.3c.

90% Ferrosilicon: Contract, carload, lump, bulk, 17.25c per lb of contained Si, carload packed 18.45c, ton lot 19.4c, less ton 20.45c. Delivered. Spot, add 0.25c.

Silicon Metal: (Mn 97% Si and 1% max Fe). C.l. lump, bulk, regular 18.5c per lb of Si, c.l. packed 19.7c, ton lot 20.6c, less ton 21.6c. Add 0.5c for max, 0.10% calcium grade. Deduct 0.5c for max 2% Fe grade analyzing min. 96% Si. Spot, add 0.25c.

Alsifer: (Approx. 20% Al, 40% Si, 40% Fe). Contract, basis f.o.b. Niagara Falls, N. Y., lump, carload, bulk, 9.25c per lb of alloy, ton lots packed 10.15c, 200 to 1999 lb 10.50c, smaller lots 11c.

ZIRCONIUM ALLOYS

12-15% Zirconium Alloy: (Zr 12-15%, Si 30-43%, Fe 40-45%, C 0.20% max). Contract, c.l. lump, bulk 8.0c per lb of alloy, c.l. packed 8.75c, ton lot 9.5c, less ton 10.35c. Delivered. Spot, add 0.25c.

35-40% Zirconium Alloy: (Zr 35-40%, Si 47-52%, Fe 8-12%, C 0.50% max). Contract, carload, lump, packed 25.25c per lb of alloy, ton lot 26c, less ton 27.25c. Freight allowed. Spot, add 0.25c.

BORON ALLOYS

Ferroboron: (B 17.50% min, Si 1.50% max, Al 0.50% max, C 0.50% max). Contract, 100 lb or more 1" x D, $1.20 per lb of alloy. Less than 100 lb $1.30. Delivered. spot add 5c. F.o.b. Washington, Pa., prices, 100 lb and over are as follows: Grade A (10-14% B) 85c per pound; Grade B (14-18% B) $1.20; Grade C (19% min M) $1.50.

Borosil: (3 to 4% B, 40 to 45% Si). $5.25 per lb contained B, delivered to destination.

Bortam: (B 1.5-1.9%). Ton lots, 45c per lb; smaller lots, 50c per lb.

Carbortam: (B 1 to 2%) Contract, lump, carloads 9.50c per lb f.o.b. Suspension Bridge, N. Y., freight allowed same as high-carbon ferrotitanium.

CALCIUM ALLOYS

Calcium-Manganese-Silicon: (Ca 16-20%, Mn 14-18% and Si 53-59%). Contract, carload, lump, bulk 20.0c per lb of alloy, carload packed 20.8c, ton lot 22.3c, less ton 23.3c. Delivered. Spot, add 0.25c.

Calcium-Silicon: (Ca 30-33%, Si 60-65%, Fe 1.50-3%). Contract, carload, lump, bulk 19.0c per lb of alloy, carload packed 20.2c, ton lot 22.1c, less ton 23.6c. Deld. Spot, add 0.25c.

BRIQUETTED ALLOYS

Chromium Briquets: (Weighing approx. 3⅝ lb each and containing exactly 2 lb of Cr). Contract, carload, bulk, 16.25c per lb of briquet, carload packed 16.95c, ton 17.75c, less ton 18.65c. Deld. Add 0.25c for notching. Spot, add 0.25c.

Ferromanganese Briquets: (Weighing approx. 3 lb and containing exactly 2 lb of Mn). Contract, carload, bulk 12.05c per lb of briquet, c.l. packaged 12.85c, ton lot 13.65c, less ton 14.55. Delivered. Add 0.25c for notching. Spot, add 0.25c.

Silicomanganese Briquets: (Weighing approx. 3½ lb and containing exactly 2 lb of Mn and approx. ½ lb of Si). Contract, c.l. bulk 12.65c per lb of briquet, c.l. packaged 13.45c, ton lot 14.25c, less ton 15.15c. Delivered. Add 0.25c for notching. Spot, add 0.25c.

Silicon Briquets: (Large size—weighing approx. 5 lb and containing exactly 2 lb of Si). Contract, carload, bulk 6.75c per lb of briquet. Packed c.l. 7.55c, ton lot 8.35c, less ton 9.25c. Delivered. Spot, add 0.25c.

(Small size—Weighing approx. 2½ lb and containing exactly 1 lb of Si). Carload, bulk 6.9c. Packaged c.l. 7.7c, ton lot 8.5c, less ton 9.4c. Delivered. Add 0.25c for notching, small size only. Spot, add 0.25c.

Molybdic-Oxide Briquets: (Containing 2½ lb of Mo each) $1.14 per pound of Mo contained. f.o.b. Langeloth, Pa.

TUNGSTEN ALLOYS

Ferrotungsten: (70-80%), 5000 lb W or more $3.80 per lb of contained W; 2000 lb W to 5000 lb W, $3.90; less than 2000 lb W, $4.02. f.o.b. Niagara Falls, N. Y.

OTHER FERROALLOYS

Ferrocolumbium: (Cb 56-60%, Si 8% max, C 0.4% max). Contract, ton lot, 2" x D, $12 per lb of contained Cb, less ton $12.05. Delivered. Spot, add 10c.

Ferrotantalum—Columbium: (Cb 40% approx., Ta 20% approx., and Cb and Ta 60% min, C 0.30% max) ton lots, 2" x D, $6.25 per lb of contained Cb plus Ta, deld.; less ton lots $6.30.

Silicaz Alloy: (Si 35-40%, Ca 9-11%, Al 6-8%, Zr 3-5%, Ti 9-11%, B 0.55-0.75%). Carload packed 1" x D, 45c per lb of alloy, ton lot 47c, less ton 49c. Delivered.

SMZ Alloy: (Si 60-65%, Mn 5-7%, Zr 5-7%, Fe 20% approx). Contract, carload, packed, ½" x 12 M, 17.5c per lb of alloy, ton lots 18.25c, less ton 19.5c. Deld. Spot, add 0.25c.

Graphidox No. 4: (Si 48-52%, Ca 5-7%, Ti 9-11%). C.l. packed, 17.50c per lb of alloy; ton lots 18.50c; less ton lots 20c, f.o.b. Niagara Falls, N. Y.; freight allowed to St. Louis.

V-5 Foundry Alloy: (Cr 38-42%, Si 17-19%, Mn 8-11%). C.l. packed 16.6c per lb of alloy; ton lots 18.10c; less ton lots 19.35c, f.o.b. Niagara Falls; freight allowed to St. Louis.

Siminal: (Approx. 20% each Si, Mn, Al; bal. Fe). Lump, carload, bulk 15.50c. Packed c.l. 16.50c, 2000 lb to c.l. 16.75c, less than 2000 lb 17.25c per lb of alloy. Delivered.

Ferrophosphorus: (23-25% based on 24% P content with unitage of $4 for each 1% of P above or below the base); carloads, f.o.b. sellers' works, Mt. Pleasant, Siglo, Tenn., $90 per gross ton.

Ferromolybdenum: (55-75%). Per lb contained Mo, f.o.b. Langeloth, Pa., $1.32 in all sizes except powdered which is $1.41; Washington, Pa., furnace, any quantity $1.32.

Technical Molybdic-Oxide: Per lb contained Mo, f.o.b. Langeloth, Pa., $1.14 in cans; in bags, $1.13, f.o.b. Langeloth, Pa.; Washington, Pa., $1.13.

(*Concluded from page* 150)

ucts Co., North Tonawanda, N. Y., to American Bridge Division, U. S. Steel Corp., Pittsburgh.

230 tons, substructure, New Jersey approach to Philadelphia-Gloucester bridge, contract P-2, Delaware Bridge Authority, through Conduit & Foundation to American Bridge Division, U. S. Steel Corp., Pittsburgh.

216 tons, high school, Marysville, Wash., to Isaacson Iron Works, Seattle.

170 tons, plant construction, New Jersey Zinc Co., New York, to Belmont Iron Works, Eddystone, Pa.

150 tons, dumping board, Moran Towing Co., 36th St. and East river, New York, through Walsh Construction Co. to Bethlehem Steel Co., Bethlehem, Pa.

135 tons, automotive maintenance shops, MacGuire Air Force Base, Wrightstown, N. J., through Hall-Meslin Co., general contractor, to White Plains Iron Works, White Plains, N. Y.

100 tons, foreign project for a Bell Telephone subsidiary, to Belmont Iron Works, Eddystone, Pa.

100 tons, addition to Washington state prison, Walla Walla, Wash., to Pacific Car & Foundry Co., Seattle; Lewis Construction Co., Seattle, general contractor.

Unstated, replacement of cable bands and suspenders on Manhattan bridge, New York, to John A. Roebling Sons Co., Trenton, N. J.

STRUCTURAL STEEL PENDING

6000 tons, superstructure, contract G-2, New Jersey approach to Delaware river bridge between Philadelphia and Gloucester, N. J., for Delaware River Bridge Authority, Bethlehem Steel Co., Bethlehem, Pa., low

2500 tons, viaduct, contract 2, Northeast expressway, Chelsea, Mass.; bids Nov. 23, Boston.

2185 tons, bridges, Elkhart county, Indiana Toll Road Commission, contracts C-33/34, C-35 and C-36/37; bids Dec. 1, Indianapolis.

2100 tons, maintenance hangar and shops, air field base, Blytheville, Ark.; bids Nov. 23, Corps of Engineers, Little Rock, Ark.

925 tons, six state bridges, Revere Beach parkway, Everett, Mass.; Gil Wyner Co., Inc., Malden, Mass., $2,623,674.

733 tons, municipal bridges, Frankford creek flood control, Philadelphia; bids Nov. 23.

510 tons, two stringer bridges, Dedham-Westwood, Mass.; bids Nov. 30, Department of Public Works, Boston.

425 tons, Glenco dam, Wyoming; Lytle & Green Construction Co., Sioux City, Iowa, low.

350 tons, high school, Hudson, Mass.; bids Dec. 9.

200 tons, miscellaneous structures, DuPont interests, Karney's Point, Pa.; bids asked.

190 tons, two state highway bridges, Edmunds-Dennysville, Me.; bids to Augusta, Me.; also 55 tons, reinforcing steel.

REINFORCING BARS . . .

REINFORCING BARS PLACED

725 tons, superstructure, Rappahannock river bridge, Greys Point, Va., to Bethlehem Steel Co., Bethlehem, Pa.; 12,725 tons of structural steel for this project was also placed with Bethlehem (noted last week).

200 tons, addition to Washington state prison, Walla Walla, Wash., to Soule Steel Co., Seattle.

200 tons, two contracts, warehouse and shops, Whittier, Alaska, to Pacific Alaska Contractors, Tacoma, Wash.

REINFORCING BARS PENDING

2000 tons, Glenco dam, Wyoming; Lytle & Green Construction Co., Souix City, Iowa, low at $6,270,790 to Bureau of Reclamation, Casper, Wyoming.

1420 tons, bridges, Elkhart county, Indiana Toll Road Commission, contracts C-33/34, C-35 and C-36/37; bids Dec. 1, Indianapolis.

440 tons, six state bridges, Revere Beach parkway, Everett, Mass.; Gil Wyner Co., Inc., Malden, Mass., low.

210 tons, highway and two stringer bridges, Dedham-Westwood, Mass.; bids Nov. 30, Department of Public Works, Boston.

100 tons plus, two 4-story dormitories for Seattle University, Seattle; John H. Sellen Construction Co., Seattle, low at $983,423.

100 tons, including 10 gates, etc., Idaho state highway projects, Bannock and Camas counties; bids to Boise, Idaho, Nov. 23.

100 tons, 220-ft bridge, Mt. Rainier, National Park, Washington state; general contract to John E. Alexander, Seattle, low at $61,826, by Bureau of Public Roads.

PLATES . . .

PLATES PENDING

850 tons, liner plates, Glenco dam, Wyoming; bids in to the Bureau of Reclamation, Casper, Wyoming.

500 tons, hull steel, medium tensile; bids Nov. 22, General Stores Office, Navy, Philadelphia.

430 tons, hull steel, medium and high tensile, grade M. and type I, some galvanized, General Stores Office, Navy, Philadelphia.

165 tons, marine boiler plate, east and west yards, General Stores Supply Office, Navy, Philadelphia.

Unstated tonnage, 3085 ft, 36-in. steel pipe, water line, Dedham-Westwood, Mass. Metropolitan District Commission, Boston.

PIPE . . .

STEEL PIPE PLACED

175 tons, large diameter pipe, Texas Co., Lawrenceville, Ill., to Republic Steel Co. p., Cleveland.

STEEL PIPE PENDING

Unstated, 10,000 feet 6-in., also hydrants, etc.; bids to Vancouver, Wash., Nov. 22.

RAILS, CARS . . .

RAILROAD CARS PLACED

Ford Motor Co., 200 seventy-ton gondolas, to the Thrall Car Mfg. Co., Chicago Heights, Ill.

Seaboard Air Line railroad, 1000 freight cars costing $6,680,000 as follows: 500 fifty-ton box cars to ACF Industries Inc., St. Louis; 400 fifty-ton box cars to Pullman-Standard Car Mfg. Co., Bessemer, Ala.; 10 seventy-ton phosphate rock cars to Bethlehem Steel Co., Johnstown, Pa.

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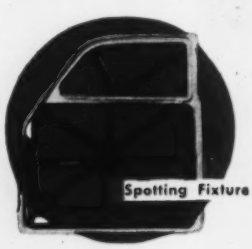
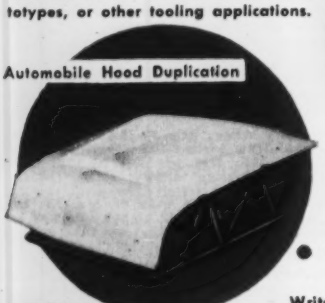


Spotting Fixture



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For complete information on the NICE LINE write for Catalog No. 150.

NICE BALL BEARING CO.

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Ores

Lake Superior Iron Ore

(Prices effective July 1, 1953, and thereafter; gross ton, 51.50% iron natural, rail of vessel, lower lake ports.)

Old range bessemer	$10.30
Old range nonbessemer	10.15
Mesabi bessemer	10.05
Mesabi nonbessemer	9.90
Open-hearth lump	11.15
High phosphorus	9.90

The foregoing prices are based on upper lake rail freight rates, lake vessel freight rates, handling and unloading charges, and taxes thereon which were in effect on June 24, 1953, and increases or decreases after such date are for buyer's account.

Eastern Local Iron Ore

Cents per unit deld. E. Pa.

Foundry and basic 52-62% contract	17.00-18.00

Foreign Iron Ore

Cents per unit, c.i.f. Atlantic ports

Swedish basic, 60 to 68%	20.00
N. African hematite (spot)	nom. 20.00-22.00
Brazilian iron ore, 68-69% (spot)	25.00

Tungsten Ore

Net ton unit, before duty

Foreign Wolframite, good commercial quality	$25.00-$26.00
Domestic scheelite, mine	63.00

Manganese Ore

Mn 48%, nearby, 90c-92c per long ton unit c.i.f. U. S. ports, duty for buyer's account: 46-47%, 80c.

Chrome Ore

Gross ton, f.o.b. cars New York, Philadelphia, Baltimore, Charleston, S. C., plus ocean freight differential for delivery to Portland, Oreg., or Tacoma, Wash.

Indian and African

48% 2.8:1	nom. $40.00-$42.00
48% 3:1	42.00-44.00
48% no ratio	32.00-34.00

South African Transvaal

44% no ratio	$19.00-$20.00
48% no ratio	31.00-32.00

Domestic

(Rail nearest seller)

18% 3:1	$39.00

Molybdenum

Sulphide concentrate, per lb, Mo content mines unpacked	$1.00

Antimony Ore

Per unit of Sb content, c.i.f. seaboard

50-60%	$3.35-$3.85
60-65%	4.00-4.35

Vanadium Ore

Cents per lb V_2O_5 content, deld. mills

Domestic	31.00

Refractories

Fire Clay Brick (per 1000)

High-Heat Duty: Pueblo, Colo., $94; Ashland, Grahn, Hayward, Hitchins, Haldeman, Olive Hill, Ky., Athens, Troup, Tex., Beech Creek, Clearfield, Curwensville, Lock Haven, Lumber, Orviston, West Decatur, Pa., Bessemer, Ala., Farber, Mexico, St. Louis, Vandalia, Mo., Ironton, Oak Hill, Parral, Portsmouth, O., Ottawa, Ill., Stevens Pottery, Ga., Woodbridge, N. J., $114; Salina, Pa., $119; Niles O., $125; Los Angeles, Pittsburg, Calif., $137.20.

Silica Brick (per 1000)

Standard: Alexandria, Claysburg, Mt. Union, Sproul, Pa., Ensley, Ala., Portsmouth, O., $120; Warren, Niles, O., Hays, Pa., $125; Morrisville, Pa., $123.50; E. Chicago, Ind., Joliet, Rockdale, Ill., $130; Cutler, Utah, $121.55; Los Angeles, $127.85.

Super Duty: Hays, Sproul, Pa., Warren, Windham, O., Athens, Tex., $137; Morrisville, Pa., Niles, O., $140; Joliet, Ill., $143.

Semisilica Brick (per 1000)

Clearfield, Pa., $130.

Insulating Fire Brick (per 1000)

2300° *F:* Massillon, O. $178.50; Clearfield, Pa., $213; Augusta, Ga., Beaver Falls, Zelienople, Pa., Mexico, Mo., $206; Vandalia, Mo., $214.10; Portsmouth, O., $207.50; Bessemer, Ala. $212.80.

Ladle Brick (per 1000)

Dry Pressed: Bessemer, Ala., $64.60; Alsey, Ill., Chester, New Cumberland, W. Va., Freeport, Johnstown, Merrill Station, Pa., Mexico, Mo., $77.50; Wellsville, O., $81.50; Clearfield, Pa., Portsmouth, O., $87; Perla, Ark., $109; Los Angeles, $110.25; Pittsburg, Calif., $111.30.

High-Alumina Brick (per 1000)

50 *Per Cent:* Clearfield, Pa., St. Louis, Mexico, Mo., $181; Danville, Ill., $169.30.

60 *Per Cent:* St. Louis, Mexico, Vandalia, Mo., Clearfield, Pa., $225; Danville, Ill., $213.20.

70 *Per Cent:* St. Louis, Mexico, Vandalia, Mo., $260; Danville, Ill., $258; Clearfield, Pa., $267.

Sleeves (per 1000)

Reesdale, Johnstown, Bridgeburg, Pa., $147; Clearfield, Pa., $148.50; St. Louis, $159.30; Athens, Tex., $155.

Nozzles (per 1000)

Reesdale, Pa., $234.70; Johnstown, Pa., $240.70; Clearfield, Pa., $241.40; St. Louis, $259.45; Athens, Tex., $247.70; Bridgeburg, Pa., $267.50.

Runners (per 1000)

Reesdale, Pa., $183.50; Johnstown, Bridgeburg, Pa., $183.50; Clearfield, Pa., $185.50; St. Louis, $195.80; Athens, Tex., $191.80.

Dolomite (per net ton)

Domestic dead-burned bulk; Billimeyer, Blue Bell, Williams, Plymouth Meeting, York, Pa., Millville, W. Va., Bettsville, Millersville, Martin, Nario, Gibsonburg, Woodville, O., $14.50; Thornton, McCook, Ill., $15.10; Dolly Siding, Bonne Terre, Mo., $13.65.

Magnesite (per net ton)

Domestic, dead-burned bulk, ¾-in. grains with fines: Luning, Nev., Chewelah, Wash., $38.

Metallurgical Coke

Price per net ton

Beehive Ovens

Connellsville, furnace	$13.50-$14.00
Connellsville, foundry	16.50-17.00

Oven Foundry Coke

Kearny, N. J., ovens	$24.00
Everett, Mass., ovens	
New England, deld.	*26.05
Chicago, ovens	24.50
Chicago, deld.	26.00
Terre Haute, ovens	24.05
Milwaukee, ovens	25.25
Indianapolis, ovens	24.25
Cincinnati, deld.	25.85
Painesville, O., ovens	25.50
Cleveland, deld.	27.43
Erie, Pa., ovens	25.00
Birmingham, ovens	22.65
Cincinnati, deld.	27.58
Buffalo, ovens	25.00
Buffalo, deld.	26.25
Lone Star, Tex., ovens	18.50
Philadelphia, ovens	23.00
Swedeland, Pa., ovens	23.00
St. Louis, ovens	
St. Louis, deld.	26.00
St. Paul, ovens	23.75
Portsmouth, O., ovens	24.00
Cincinnati, O., deld.	26.62
Detroit, ovens	25.50
Detroit, deld.	26.50
Pontiac, deld.	27.06
Saginaw, deld.	28.58

*Or within $4.55 freight zone from works.

Coal Chemicals

Spot, cents per gallon, ovens

Pure benzol	40.00
Toluol, one deg	32.00-35.00
Industrial xylol	32.00-35.00

Per ton, bulk, ovens

Sulphate of ammonia	$42-$45
Birmingham area	42.00†

†With port equalization against imports.

Cents per pound, producing point

Phenol 40 deg. (U.S.P.), tank cars	18.00
c.l. drums	19.00
l.c.l. drums	19.50

Fluorspar

Metallurgical grades, f.o.b. shipping point, in Ill., Ky., net tons, carloads, effective CaF_2 content 72.5%, $35-$36; 70%, $32-$33; 60%, $28-$29. Imported, net ton, duty paid, metallurgical grade: European, $28-$30; Mexican, $25.50.

Electrodes

(Threaded with nipple, unboxed f.o.b. plant)

GRAPHITE

Diam.	Length	Per 100 lb
2	24	$43.50
2½	30	28.00
3	40	27.25
4	40	26.00
5⅛	40	25.75
6	60	23.25
7, 8, 9, 10	60	21.00
12, 14	72	20.50
16	72	20.00
17	80	20.50
18	72	20.00
20	72	20.00

CARBON

40	100	$8.95
40, 35, 30	110	8.95
30	84	9.10
24	96	8.90
24	72, 84	9.10
20	90	8.95
20	84	9.10
17	72	9.10
17	60	9.50
14	72	9.50
14, 12, 10	60	10.30
8	60	10.55

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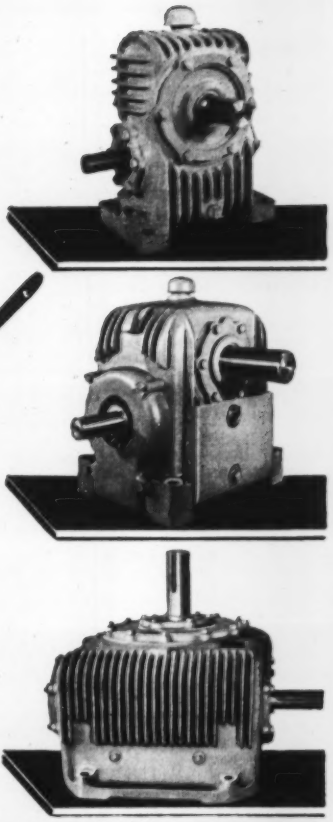

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The Cone-Drive story's an amazing one—choose from over 190,000 standard stock models with ratios from 5:1 to 4900:1 to handle loads from fractional to 800 hp.

Get all the facts in Bulletin 8901-50.

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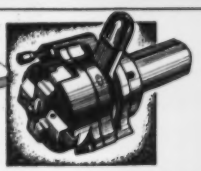

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Scrap . . .

Scrap Prices, Page 158

Washington—Surveillance of iron and steel scrap exports is being tightened by the Commerce Department's Bureau of Foreign Commerce. The bureau is granting licenses for shipments over the next three months only. Previous practice was to give them for six months.

The bureau is interested in making sure that scrap moving out of the country goes only to friendly countries. This is not difficult since Russia in 1954 has been exporting scrap to a number of countries.

Although consumption of purchased scrap by U. S. consumers in 1953 was 31.6 million tons, the Commerce Department recognizes these consumers will not use more than 24 million tons this year.

Under such conditions, a policy of cutting down on exports of scrap would be tantamount to price control, and that's something which the government does not intend to do at this time and for which it has no authority.

Employment in the scrap industry again is improving after having dropped from a normal 200,000 down to 140,000 as of last March.

Boston—Three shipping point prices now apply to steel scrap: 1. Pennsylvania shipment, the lowest. 2. District consumers. 3. Export, dock. Except for Pennsylvania shipment, prices are unchanged, but No. 2 heavy melting and No. 2 bundles are up $1, shipping point, for that area.

Although some scrap for export is being loaded, the edge on new buying has been dulled.

New York—Except for a slight easing in No. 2 bundles, now holding at $21, brokers' buying prices are unchanged throughout the list. Movement abroad was hindered by a rail embargo here last week, because of the heavy influx of material. At one time there were 355 cars of scrap at Jersey City awaiting unloading at the docks.

Philadelphia—With the stevedore strike settled, sentiment in the scrap market has firmed up, but prices on the major grades of steelmaking scrap are unchanged. Mixed borings and turningse are somewhat easier.

Cleveland—Steelmaking grades of scrap are off $1 per ton based on small sales last week. Other grades are unchanged. Indications are the market has about reached top.

Buffalo—Dealers are declining additional orders for steelmaking grades of scrap at prevailing prices. The $1 per ton drop in prices a week ago has left the market in an unsettled state despite the surge in steel output to 97.5 per cent of capacity.

Pittsburgh—Softness in the market here is caused by a scarcity of orders for blast furnace and open hearth scrap. No. 2 heavy melting and No. 2 bundles are off $1 a ton. An area mill bought small quantities of No. 1 heavy melting at $34 last week. At the same time a larger volume of that grade sold for $35.

Cincinnati—Prices hold steady as scrap continues to move in good volume. Signs of a softening market in other cities are not reflected.

Detroit—No. 1 grades of steel scrap remain strong, but some weakness is showing in the No. 2 grades and blast furnace items. No. 1 heavy melting is quoted at $26, punchings and plate scrap, $28.

Chicago—Scrap prices are holding steady despite low sales volume and consumer pressure for concessions on leading grades. Brokers are showing little interest in taking business on such terms. Chief weakness is in blast furnace grades.

St. Louis—After rising for two months, railroad scrap is showing signs of softening under heavy pressure by consumers. Tie-in orders for slower-moving items are common. Buyers hope to get a rail price de-

(*Please turn to page* 160)

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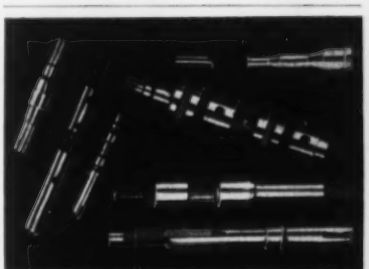

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Grand Haven Michigan

Iron and Steel Scrap

Consumer prices, per gross ton, except as otherwise noted, including broker's commission, as reported to STEEL. Changes shown in italics.

STEELMAKING SCRAP COMPOSITE

Nov. 17	$33.67
Nov. 10	33.67
Oct. Avg.	32.25
Nov. 1953	35.00
Nov. 1949	28.96

Based on No. 1 heavy melting grade at Pittsburgh, Chicago and eastern Pennsylvania.

PITTSBURGH

(Delivered consumer plant)

No. 1 heavy melting	34.00-35.00
No. 2 heavy melting	*30.00-31.00*
No. 1 bundles	34.00-35.00
No. 2 bundles	*27.00-28.00*
No. 1 busheling	33.00-34.00
Machine shop turnings	19.00-20.00
Mixed borings, turnings	19.00-20.00
Short shovel turnings	23.00-24.00
Cast iron borings	23.00-24.00
Cut structurals, 5 ft lengths	35.00-36.00
Heavy turnings	30.00-31.00
Punchings & plate scrap	36.00-37.00
Electric furnace bundles	36.00-37.00

Cast Iron Grades

No. 1 cupola	37.00-38.00
Charging box cast	32.00-33.00
Heavy breakable cast	31.00-32.00
Unstripped motor blocks	23.00-24.00
No. 1 machinery cast	42.00-43.00

Railroad Scrap

No. 1 R.R. heavy melt.	36.50-37.50
Rails, 2-ft and under	45.00-46.00
Rails, 18-in. and under	46.00-47.00
Rails, random lengths	39.00-40.00
Railroad specialties	37.50-38.50

Stainless Steel Scrap

18-8 bundles & solids	180.00-190.00
18-8 turnings	85.00-90.00
430 bundles & solids	*70.00-75.00*
430 turnings	*55.00-57.00*

CLEVELAND

(Delivered consumer plant)

No. 1 heavy melting	*32.00-33.00*
No. 2 heavy melting	*28.00-29.00*
No. 1 bundles	*32.00-33.00*
No. 2 bundles	*24.00-25.00*
No. 1 busheling	*32.00-33.00*
Machine shop turnings	16.00-17.00
Mixed borings, turnings	20.00-21.00
Short shovel turnings	20.00-21.00
Cast iron borings	20.00-21.00
Low phos.	34.00-35.00
Cut structural plate 2 ft and under	38.00-39.00
Alloy free, short shovel turnings	23.00-24.00
Electric furnace bundles	*33.00-34.00*

Cast Iron Grades

No. 1 cupola	44.00-45.00
Charging box cast	33.00-34.00
Stove plate	38.00-39.00
Heavy breakable cast	30.00-31.00
Unstripped motor blocks	30.00-31.00
Brake shoes	31.00-32.00
Clean auto cast	44.00-45.00
No. 1 wheels	37.00-38.00
Burnt cast	29.00-30.00
Drop broken machinery	44.00-45.00

Railroad Scrap

No. 1 R.R. heavy melt.	35.00-36.00
R.R. malleable	44.00-45.00
Rails, 3-ft and under	47.00-48.00
Rails, 18 in. and under	48.00-49.00
Rails, random lengths	44.00-45.00
Cast steel	36.00-37.00
Railroad specialties	36.00-37.00
Uncut tires	37.00-38.00
Angles, splice bars	43.00-44.00
Rails, rerolling	*52.00-53.00*

Stainless Steel (Brokers' Buying Prices)

18-8 bundles, solids	*175.00-180.00*
18-8 turnings	70.00-80.00
430 clips, bundles, solids	*70.00*
430 turnings	40.00-50.00

YOUNGSTOWN

(Delivered consumer plant)

No. 1 heavy melting	*34.00-35.00*
No. 2 heavy melting	*29.00-30.00*
No. 1 bundles	*34.00-35.00*
No. 2 bundles	*26.00-27.00*
Machine shop turnings	14.00-15.00
Short shovel turnings	22.00-23.00
Cast iron borings	22.00-23.00
Low phos.	36.00-37.00
Electric furnace bundles	36.00-37.00

Railroad Scrap

No. 1 R.R. heavy melt.	35.00-36.00

CHICAGO

No. 1 heavy melting	32.00-34.00
No. 2 heavy melting	30.00-31.00
No. 1 factory bundles	34.00-35.00
No. 1 dealer bundles	32.00-33.00
No. 2 bundles	23.00-24.00
No. 1 busheling	32.00-34.00
Machine shop turnings	16.00-17.00
Mixed borings, turnings	18.00-19.00
Short shovel turnings	18.00-19.00
Cast iron borings	18.00-19.00
Cut structurals, 3-ft	35.00-36.00
Punchings & plate scrap	35.00-36.00
Electric furnace bundles	34.00-35.00

Cast Iron Grades

No. 1 cupola	39.00-40.00
Stove plate	32.00-33.00
Unstripped motor blocks	25.00-26.00
Clean auto cast	42.00-43.00
Drop broken machinery	42.00-43.00

Railroad Scrap

No. 1 R.R. heavy melt.	35.00-36.00
R.R. malleable	42.00-44.00
Rails, 2-ft and under	50.00-51.00
Rails, 18-in. and under	51.00-52.00
Angles, splice bars	43.00-44.00
Rails, rerolling	54.00-55.00

Stainless Steel Scrap

18-8 clips & solids	175.00-180.00
18-8 turnings	75.00-80.00
430 clips & solids	65.00-70.00
430 turnings	30.00-40.00

Chicago Mercantile Exchange

No. 1 Heavy Melting
(Week ended Nov. 17)

	High	Low	Close
Jan.	36.00	35.75	35.75*
Mar.	36.00	36.00	36.00

Sales (40-ton units): 5 January; 1 March. *Nominal.

DETROIT

(Brokers' buying prices; f.o.b. shipping point)

No. 1 heavy melting	*26.00*
No. 2 heavy melting	20.00
No. 1 bundles	27.00
No. 2 bundles	19.50
No. 1 busheling	26.00
Machine shop turnings	12.00
Mixed borings, turnings	12.00
Short shovel turnings	14.00
Punching & plate scrap	*28.00*

Cast Iron Grades

No. 1 cupola	34.00
Charging box cast	27.00
Stove plate	30.00
Heavy breakable	25.00
Unstripped motor blocks	20.00
Clean auto cast	38.00
Malleable	30.00

CINCINNATI

(Brokers' buying prices; f.o.b. shipping point)

No. 1 heavy melting	30.00-31.00
No. 2 heavy melting	27.00-28.00
No. 1 bundles	30.00-31.00
No. 2 bundles	21.00-22.00
No. 1 busheling	30.00-31.00
Machine shop turnings	17.00-18.00
Mixed borings, turnings	18.00-19.00
Short shovel turnings	18.00-19.00
Cast iron borings	18.00-19.00
Low phos. 18-in.	35.00-36.00

Cast Iron Grades

No. 1 cupola	39.00
Heavy breakable cast	36.00
Charging box cast	36.00
Drop broken machinery	45.00

Railroad Scrap

No. 1 R.R. heavy melt.	33.00-34.00
Rails, 18-in. and under	47.00-48.00
Rails, random lengths	39.00-40.00

PHILADELPHIA

(Delivered consumer plant)

No. 1 heavy melting	33.50
No. 2 heavy melting	31.50
No. 1 bundles	33.50
No. 2 bundles	27.50
No. 1 busheling	31.00
Electric furnace bundles	33.50
Machine shop turnings	19.50
Mixed borings, turnings	*19.00-19.50*
Short shovel turnings	21.00-22.00
Structurals & plate	35.00-36.00
Heavy turnings	31.00-31.50
Couplers, springs, wheels	35.00
Rail crops, 2 ft & under	45.00

Cast Iron Grades

No. 1 cupola	35.00-36.00
Malleable	*40.00-41.00*
Heavy breakable cast	36.00-36.50
Drop broken machinery	42.00-43.00

NEW YORK

(Brokers' buying prices)

No. 1 heavy melting	27.00-28.00
No. 2 heavy melting	25.00-26.00
No. 1 bundles	27.00-28.00
No. 2 bundles	*21.00*
Machine shop turnings	10.00-11.00
Mixed borings, short turnings	11.00-12.00
Low phos. (structural & plate)	29.00-30.00
Short shovel turnings	12.50-13.50

Cast Iron Grades

No. 1 cupola	29.00-30.00
Unstripped motor blocks	23.00-24.00

Stainless Steel

18-8 sheets, clips, solids	170.00-175.00
18-8 borings, turnings	70.00-75.00
430 sheets, clips, solids	50.00
410 sheets, clips, solids	40.00

BOSTON

(Brokers' buying prices; f.o.b. shipping point)

No. 1 heavy melting	23.00-24.00
No. 2 heavy melting	*21.00*
No. 1 bundles	24.00-25.00
No. 2 bundles	*17.50*
Mixed borings, turnings	10.00-10.50
Machine shop turnings	9.50-10.00
Short shovel turnings	11.50-12.00
No. 1 cast	29.00-30.00
Mixed cupola cast	27.00-28.00
No. 1 machinery cast	32.00-33.00

BUFFALO

No. 1 heavy melting	*32.00-33.00*
No. 2 heavy melting	*28.50-29.50*
No. 1 bundles	*32.00-33.00*
No. 2 bundles	*26.50-27.50*
No. 1 busheling	*32.00-33.00*
Machine shop turnings	16.50-17.50
Mixed borings, turnings	18.50-19.00
Short shovel turnings	19.50-20.00
Cast iron borings	18.50-19.00
Low phos.	34.00-35.00

Cast Iron Grades (F.o.b. shipping point)

No. 1 cupola	38.00-39.00
No. 1 machinery	43.00-44.00

Railroad Scrap

Rails, random lengths	35.00-36.00
Rails, 3 ft and under	42.00-43.00
Railroad specialties	36.50-37.50

BIRMINGHAM

No. 1 heavy melting	26.00-27.00
No. 2 heavy melting	24.00-25.00
No. 1 bundles	23.00-24.00
No. 2 bundles	19.00-20.00
Cast iron borings	16.00-17.00
Short shovel turnings	16.00-17.00
Machine shop turnings	15.00-16.00
Electric furnace bundles	29.00-30.00

Cast Iron Grades (F.o.b. shipping point)

No. 1 cupola	45.00-46.00
Stove plate	42.00-43.00
Bar crops and plate	33.00-34.00
Structural plate, 2 ft	33.00-34.00
Unstripped motor blocks	35.00-36.00

Railroad Scrap

No. 1 R.R. heavy melt.	30.00-31.00
Rails, 18-in. and under	40.00-41.00
Rails, rerolling	40.00-41.00
Angles, splice bars	38.00-39.00
Stand. steel axles	35.00-36.00

ST. LOUIS

(Brokers' buying prices)

No. 1 heavy melting	30.00
No. 2 heavy melting	28.00
No. 1 bundles	30.00
No. 2 bundles	23.50
Machine shop turnings	*13.00*
Short shovel turnings	*15.00*

Cast Iron Grades

No. 1 cupola	*40.00*
Charging box cast	29.00
Heavy breakable cast	29.00
Unstripped motor blocks	29.00
Brake shoes	30.00
Clean auto cast	41.00
Stove plate	35.00

Railroad Scrap

No. 1 R.R. heavy melt	35.00
Rails, 18-in. and under	46.00
Rails, random lengths	45.00-48.00
Rails, rerolling	*52.00-53.00*
Angles, splice bars	*43.00*

SEATTLE

(Delivered consumer plant)

No. 1 heavy melting	27.00
No. 2 heavy melting	23.00
No. 1 bundles	21.00
No. 2 bundles	17.00
No. 3 bundles	13.00
Machine shop turnings	12.00
Mixed borings, turnings	12.00
Short shovel turnings	12.00
Electric furnace, No. 1	32.00

Cast Iron Grades (F.o.b. shipping point)

No. 1 cupola	32.00-35.00
Heavy breakable cast	23.00
Unstripped motor blocks	25.00
No. 1 wheels	21.00
Stove plate(f.o.b. plant)	28.00
Brake shoes	28.00

Railroad Scrap (Delivered consumer plant)

Rails, random lengths	30.00-34.00

LOS ANGELES

No. 1 heavy melting	20.00
No. 2 heavy melting	16.00
No. 1 bundles	20.00
No. 2 bundles	16.00
Machine shop turnings	5.00

Cast Iron Grades (F.o.b. shipping point)

No. 1 cupola	42.00-44.00

SAN FRANCISCO

No. 1 heavy melting	24.00
No. 2 heavy melting	20.00
No. 1 bundles	23.00
No. 2 bundles	18.00
No. 1 busheling	*24.00*
Machine shop turnings	6.00
Mixed borings, turnings	6.00
Short shovel turnings	9.00
Cast iron borings	9.00
Cut structurals	25.00
Heavy turnings	9.00
Punchings & plate scrap	25.00
Electric furnace bundles	19.00

Cast Iron Grades

No. 1 cupola	43.00-46.00
Charging box cast	35.00
Stove plate	37.00
Heavy breakable cast	36.00
Unstripped motor blocks	30.00
Brake shoes	35.00
Clean auto cast	39.00
No. 1 wheels	39.00
Burnt cast	23.00
Drop broken machinery	*48.00*

HAMILTON, ONT.

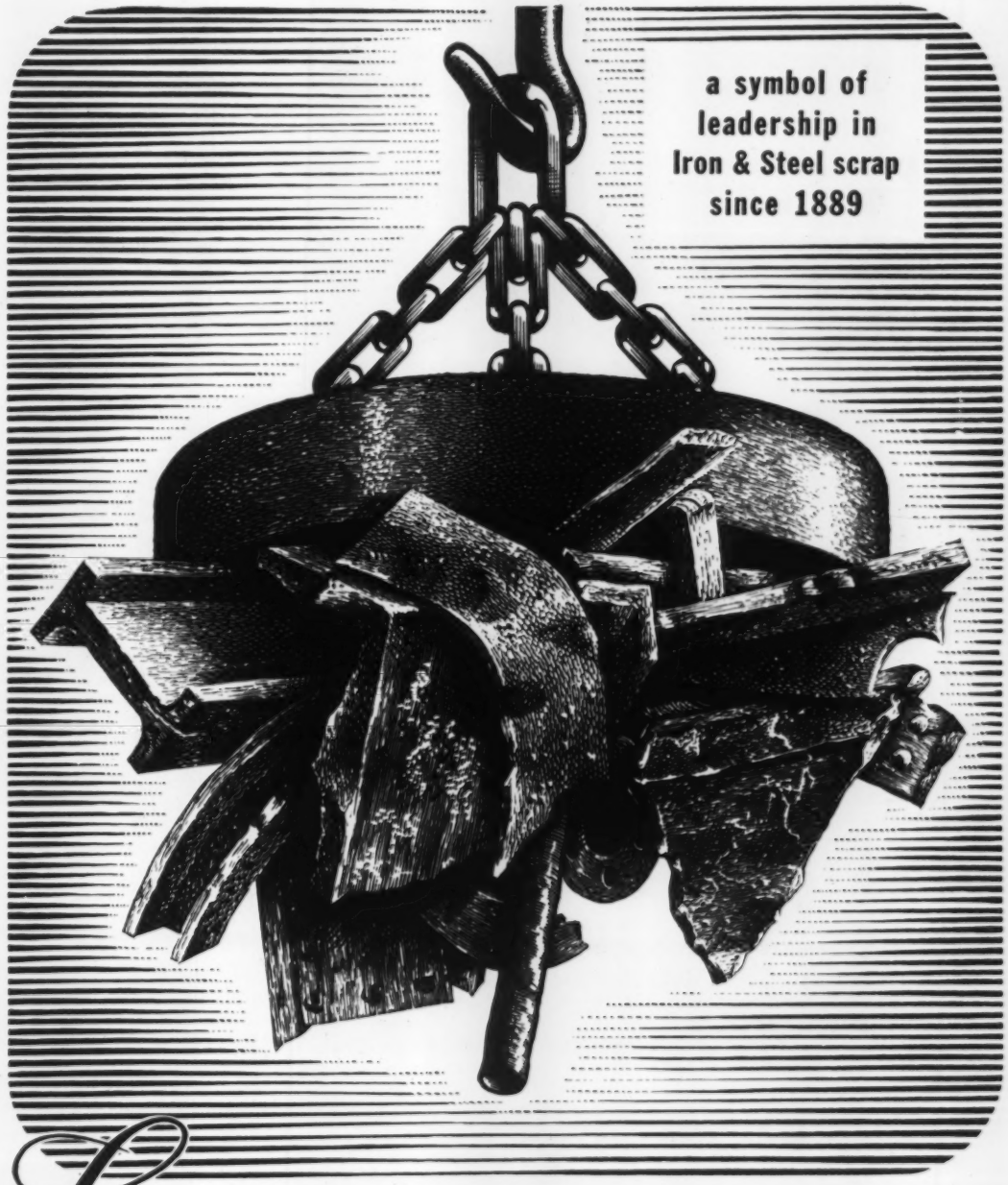
(Delivered prices)

No. 1 heavy melting	*26.00*
No. 2 heavy melting	*23.00*
No. 1 bundles	*26.00*
No. 2 bundles	*21.00*
Mixed steel scrap	*20.00*
Mixed borings, turnings	12.00
Rails, remelting	*35.00*
Busheling, new factory:	
Prepared	*24.00*
Unprepared	*20.00*
Short steel turnings	12.00

Cast Iron Grades†

No. 1 machinery cast	42.00-45.00

†F.o.b., shipping point.



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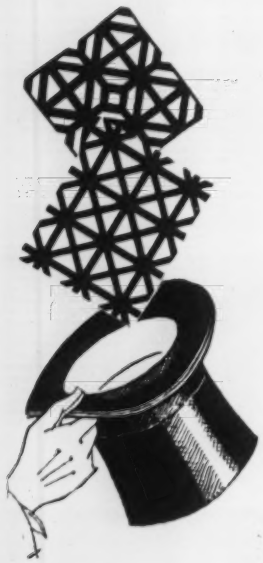

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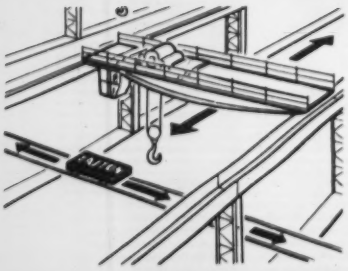

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AN EASTON 100-TON cross-bay transfer car showing general details of construction.

EASTON

A-1046

(*Concluded from page* 157)

cline started that will extend throughout the market. Cast iron is showing minor and spotty signs of life. Orders are small, but No. 1 cupola was marked up $2 last week.

Los Angeles—Increasing quantities of offshore scrap are disturbing this market, some dealers report.

Seattle—Scrap buyers are holding stocks that are sufficient to carry them into second quarter. One large mill has six months' inventory, and it is buying only from regular customers or taking in special lots.

Washington—Consumption of iron and steel scrap during September increased 3 per cent over that in August, reports the Bureau of Mines. Daily consumption was up 7 per cent. At the same time, total pig iron consumption decreased slightly.

Total melt (8,302,000 gross tons) consisted of 51.8 per cent scrap (4,297,000 tons) and 48.2 per cent pig iron (4,005,000 tons). This compares with 50.9 per cent scrap (4,164,703 tons) and 49.1 per cent pig iron (4,013,552 tons) in August.

Scrap available for consumption in the month (purchases plus home production) amounted to 4,221,000 gross tons, slightly less than during August. Home scrap accounted for 2,427,000 tons and purchased scrap 1,794,000 tons.

Stocks of ferrous scrap held by consumers at end of September amounted to 5,813,000 tons. This was a decrease of 1 per cent from August.

Wire . . .

Wire Prices, Pages 140 & 141

With new orders for 1955 model auto production coming in heavier volume, chiefly for spring, valve and other specialty wire products, first quarter bookings of wiremakers are heavier. Demand for manufacturers wire, tempered grades and fine wire specialties is less pronounced.

On most grades producers are still able to ship on short lead time and consumers are wary of inventories. Fine wire volume is dull.

Warehouse . . .

Warehouse Prices, Page 143

Highly competitive selling, coupled with slack demand and high operating costs, are serious distributor problems. In some districts they must grant price concessions on many orders which are attractive tonnage-wise, since more consumers are "price-shopping." Merchant pipe sales are frequently off 17.5 points from published quotations, even more in some instances.

Distributors generally are not ex-

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Assistant Superintendent for large Stainless Sheet and Strip Mill, located in Pittsburgh district. Must be familiar with processing methods of cold rolling, continuous annealing, pickling, etc. Should have supervisory experience. Please furnish information on background, experience, etc. with application. Reply Box 156, STEEL, Penton Building, Cleveland 13, Ohio.

Representatives Wanted

Manufacturers of heavy duty Integral Horsepower Polyphase motors for thirty years desire SALES REPRESENTATION in Pittsburgh, Cleveland and Buffalo districts. Reply Box 163, STEEL, Penton Building, Cleveland 13, Ohio.

Positions Wanted

PLANT AND PRODUCTION MANAGER, Engineering Graduate (M.I.T.) indoctrinated in practical operating experience. Proven record of accomplishment in efficient plant supervision, control, and cost reduction coupled with amicable labor relations. Reply Box 134, STEEL, Penton Building, Cleveland 13, Ohio.

EXPERIENCED FORGING ENGINEER AVAILABLE. Expert in hand tools and railroad work, production, design and management. Willing to travel. Passport in order. Reply Box 145, STEEL, Penton Building, Cleveland 13, Ohio.

SEASONED EXECUTIVE
With Strong Background

PRODUCTION, PLANT ENG., TOOL ENG. Desires broader opportunity. Functions well at policy level. Presently master mechanic of $3,000,000 stamping and assembly manufacturing company. Reply Box 149, STEEL, Penton Building, Cleveland 13, Ohio.

CHIEF ENGINEER

Desires change. Twenty-five years experience in sheet metal stampings and related assemblies. Specialized in progressive and deep draw dies. Good organizer, functions well at top level. Reply Box 150, STEEL, Penton Building, Cleveland 13, Ohio.

INDUSTRIAL SALESMAN

Over twelve years record maker in steel warehouse sales and administration. Large following throughout Greater New York and Upper New York State. Interested in connection with steel or other industrial organization. Willing to travel or change residence. Reply Box 168, STEEL, Penton Building, Cleveland 13, Ohio.

POWER AUTHORITY
OF THE STATE OF NEW YORK
ADVERTISEMENT FOR PROPOSALS FOR THE FABRICATION AND ERECTION OF THE SUPERSTRUCTURE FOR THE BARNHART ISLAND BRIDGE OVER THE ST. LAWRENCE RIVER NEAR MASSENA, ST. LAWRENCE COUNTY, NEW YORK
SPECIFICATIONS NO. 5422-C
ST. LAWRENCE CONTRACT NO. 6

NOTICE TO CONTRACTORS: The POWER AUTHORITY OF THE STATE OF NEW YORK will receive sealed proposals for the fabrication and erection of the superstructure for the Barnhart Island Bridge over the St. Lawrence River, near Massena, St. Lawrence County, New York, until 10:30 A.M., Eastern Standard Time, on the 7th day of December 1954, at 270 Broadway, Room 1207A, New York 7, New York, at which time and place proposals will be publicly opened and read aloud.

Plans, specifications and Proposal Forms for the work will be on file in the Authority's office and in the offices of Engineers, Praeger-Kavanagh, 126 East 38th Street, New York, New York; The Hydro-Electric Power Commission of Ontario, 620 University Avenue, Toronto 2, Ontario, and may be inspected by prospective bidders during office hours.

Plans, specifications and Proposal Forms may be obtained from the Power Authority of the State of New York, 270 Broadway, Room 1300, New York 7, New York, on or after November 15, 1954, upon application and pre-payment of a fee of Forty Dollars ($40.00) per set, no part of which will be refunded. Extra sets of plans at $20.00 each or specifications at $20.00 each may be obtained by any contractor who purchases a full set.

Bids must be made upon the proposal forms included in the Contract Documents. Each proposal must be accompanied by draft or certified check payable to the order of the Power Authority of the State of New York for the sum of One Hundred Fifty Thousand Dollars ($150,000.00).

The right is reserved to reject any or all bids.

W. S. CHAPIN, GENERAL MANAGER

RAILWAY EQUIPMENT
FOR SALE
Used — As Is — Reconditioned
RAILWAY CARS—
ALL TYPES
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RAILS
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Chicago 33, Illinois
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New York 7, New York
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"ANYTHING containing IRON or STEEL"

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For small long-established Forging Plant in Akron, Ohio. Prefer man who has a good knowledge of Small Upsetters (2" sizes), Drop Hammers (3000 lbs), Maxi Presses, Punch Press, Tool and dies, etc. Plant manufactures nationally known line of Mechanic Hand Tools.

If you have proven supervisory and management ability in directing a working force of approximately 50 people, write stating full particulars, salary expected, etc.

Box 155, STEEL
Penton Building Cleveland 13, Ohio

ENGINEERING GRADUATE FOR ASSISTANT TO SUPERINTENDENT
HOT & COLD STRIP MILL
PITTSBURGH DISTRICT
SOME PRACTICAL OPERATING EXPERIENCE NECESSARY
BETWEEN AGE 30-40
PREFERENCE FOR COST ANALYSIS AND OPERATIONAL PLANNING WORK
OPPORTUNITY FOR ADVANCEMENT IN OPERATIONS
APPLICATIONS TREATED
IN STRICT CONFIDENCE
WRITE FULL
BACKGROUND AND EXPERIENCE
WITH SALARY DESIRED
REPLY BOX 165, STEEL
PENTON BLDG. CLEVELAND 13, OHIO

EXECUTIVE ENGINEER

Outstanding opportunity with well-established manufacturer of heavy precision equipment to head up a well-rounded engineering department of 50 people in all phases, including research and development. Must have 15 years deep experience in heavy machinery design, plus executive responsibilities. Also require a comprehensive knowledge of large machine shop operation.

A qualified candidate must possess excellent administrative ability, deep analytical sense and high level of imagination and ingenuity, all proved by his record.

Age limits: 42-50. Engineering Degree required—ME preferred.

There is a real career here for the right man.

Send full details in complete confidence through our advertising counsel by addressing Department 4112W, Albert Frank—Guenther Law, Inc., 131 Cedar Street, New York 6, N. Y.

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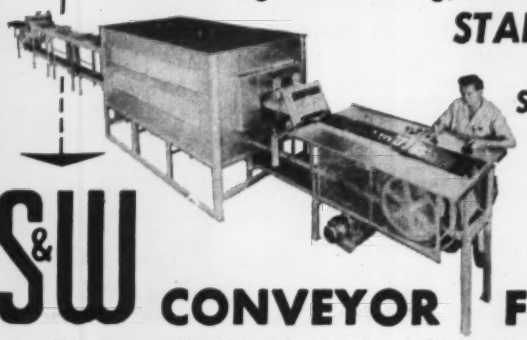
STAINLESS STEEL

Stampings
Screw Machine
Parts



S&W CONVEYOR FURNACES

Now you can make substantial savings in time, materials, labor and floor space—finish your metal parts on a *continuous production* basis with the Sargeant & Wilbur Conveyor Furnace Method.

Your Samples Processed Free

Let us show you how the S & W Conveyor Furnace Method will bright-anneal, bright-harden or bright-braze your own work. Just send us samples and specifications. No obligation.

Work comes out scale-free, bright and clean. No pickling, tumbling or sand blasting required. Sharp designs and edges are retained, work surfaces are free from etching.

Both the 18-8 and 400 series of Stainless Steels, as well as other steels and non-ferrous metals, can be treated by the S & W Method. A special S & W bright brazing alloy resists dulling and matches the metal color perfectly, makes joints practically invisible.

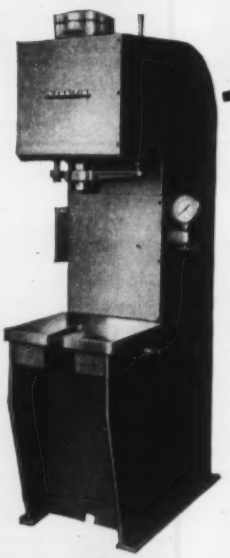
Write now for free descriptive folder giving complete details about this new money-saving method.

S&W **SARGEANT & WILBUR, INC.**
182 Weeden Street, Pawtucket, R. I.

Complete Line of Electric and Fuel-Fired Furnaces To Meet Every Industrial Need
Atmosphere Generators • Ammonia Dissociators • Gas Conditioning Equipment

PRICE LIST

ON HANNIFIN STOCK HYDRAULIC PRESSES



1-TON	$ 552
2-TON	$ 627
5-TON	$1,286
8-TON	$1,581
10-TON	$1,855
25-TON	$3,681

Prices complete with motors and starters F.O.B. our press plant, St. Marys, Ohio, subject to change without notice.

DELIVERY FROM STOCK

Demand for these popular presses is so consistent we are able to produce them in quantity and pass the savings along to you.

Construction-wise and quality-wise these small general-purpose presses are identical to the larger Hannifin presses, up to 150 tons. Special, optional controls when needed.

WRITE for complete information on the Hannifin Hydraulic Press you're interested in.

HANNIFIN

HANNIFIN CORPORATION, 523 S. WOLF ROAD, DES PLAINES, ILLINOIS

periencing the increase in demand reported by mills. They note some improvement in inquiries from small companies, especially those needing more flat-rolled products and bars than they did in October. Demand for structurals and plate is declining.

With stocks well balanced, warehouses are buying close to replacement needs in most products.

In the Cleveland district, business is some what better, although still spotty and irregular. Consensus there is that substantial gains will be scored through mid-December when the usual holiday slackening is anticipated.

Pig Iron . . .

Pig Iron Prices, Page 143

Blast furnace operators continue to relight additional furnaces to meet growing pig iron demands. United States Steel Corp. has resumed operations of its No. 1 blast furnace at its Youngstown Works. This furnace, which has daily rated capacity of 950 tons, has been out of production since Apr. 23 for relining. Jones & Laughlin Steel Corp. relighted its No. 5 blast furnace at its Pittsburgh Works. This furnace can produce about 750 tons of hot metal daily. It has been idle since February.

Pig iron sales, as well as melt in November will be top for the year. The foundry situation is spotty as far as operations and orders for castings go, but automotive demand for engines and parts for new model cars has expanded substantially in some shops.

Semifinished Steel . . .

Semifinished Prices, Page 138

Portsmouth Division of Detroit Steel Corp. is operating all four of its new 250-ton open hearths. The step-up in ingot production is due to increased demand for steel sheets and continued high order volume for rod and wire products.

Iron Ore . . .

Iron Ore Prices, Page 155

Shipments of iron ore from upper lake ports in the latest week of record (ended Nov. 15) totaled 791,033 gross tons, reports the Lake Superior Iron Ore Association. This compares with 1,515,132 tons in the corresponding week of the 1953 lake shipping season.

Cumulative shipments to date in the 1954 shipping season, which is rapidly nearing the close, amount to 59,824,938 gross tons. Last year shipments to Nov. 15 totaled 94,102,087 tons.

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When those small metal parts call out, "Hey, cleaning time!"
And you have to remove scale, old paint, rust or grime . . .

You can clean them in seconds and save money, too —
Pangborn's Blast Cleaning Cabinet's made just for you.

It produces a finish so smooth and so clean,
It will do the best job that you ever have seen.

Pangborn Blast Cleaning Cabinet

for efficient, low-cost cleaning of metal parts. Cleans pieces up to 35" x 60" in size. Models from $319 and up.

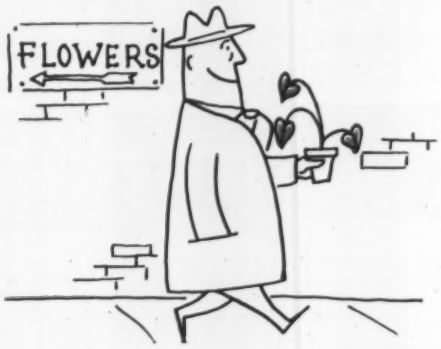
For details, write:
PANGBORN CORP., 1600 Pangborn Blvd., Hagerstown, Maryland

Pangborn

BLAST CLEANS CHEAPER
with the right equipment for every job

50th Anniversary Medallion

. . . things to watch for when buying Philodendron



But if you're buying special purpose STEELS, may we recommend the SPEED STEELS

SPEED CASE — a low carbon free machining open hearth steel

SPEED TREAT — a medium carbon free machining open hearth steel

SPEED ALLOY — a chromium alloy steel

briefly they ✓ are easy to heat-treat ✓ are fast machining ✓ give longer tool life ✓ produce better finishes

THERE ARE SPEED STEEL SPECIALISTS IN...

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☐ Lewistown, Me.	Brown Wales Co.
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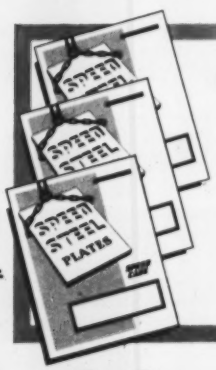


Write Today!

for new SPEED STEEL bulletins: 541 • 542 • 543

☐ *Bulletin 541* • SPEED CASE

☐ *Bulletin 542* • SPEED TREAT

☐ *Bulletin 543* • SPEED ALLOY

W. J. Holliday & Co., Inc.

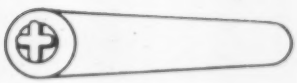
141 141st STREET • HAMMOND, INDIANA

Speed steels are produced by W. J. Holliday & Co., Inc., Speed Steel Plate Division

THIS IS AETNA-STANDARD

SEAMLESS TUBE MILLS

Aetna continues to conceive many new ideas for the production of seamless tubing. This continued progress, plus reputation and experience, helps Aetna-Standard to continue as world's leading designer and builder of Seamless Tube Mills.



ROLLS

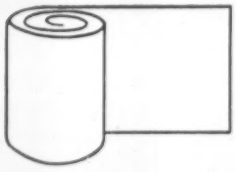
Aetna specializes in manufacture of small and medium-sized iron-base rolls. Aetna is pioneering in the use of Nodular Iron for rolls and castings under trade name of Magaloy.

FLAT-ROLLED FINISHING EQUIPMENT

This is one of Aetna's six major product lines. Flat-rolled embraces such equipment as: Shearing and Classifying; Scrubbing and Drying; Recoiling; Slitting and Side Trimming; Roller Levellers (two-high and four-high); Reels of all kinds; and many other products.

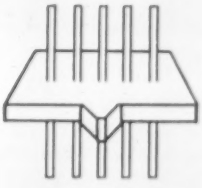
CONTINUOUS BUTT WELD PIPE MILLS

Over the years, new ideas and engineering accomplishments have strengthened Aetna's position as the only builder in America of Continuous Butt Weld Pipe Mills. In recent months, Aetna Pipe Mill equipment has been installed in America, in Canada, in Germany, in England, in Japan and in Argentina.



CONTINUOUS COATING

This year Aetna will have completed the building of 25 continuous galvanizing lines, in addition to several terne and electrolytic tinning lines. Aetna has worked closely with industry in this development and is considered the pioneer in continuous coating equipment.



COLD DRAWING

The world over, Aetna-Standard is recognized as the leading authority and builder of cold draw equipment for tubes and bars. This year marked introduction of several innovations by Aetna, such as the air gripper carriage and hook.

THE AETNA-STANDARD ENGINEERING COMPANY • PITTSBURGH, PA.

Aetna-Standard

PLANTS IN WARREN, OHIO • ELLWOOD CITY, PENNSYLVANIA

GOOD EQUIPMENT BRINGS DOWN PRODUCTION COSTS

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Aetna-Standard Engineering Company, Ltd., Toronto, Ontario, Canada.
M. Castellvi, Inc., New York, N. Y. — Mexico, Central and South America.
Societe de Constructions de Montbard, Paris, France — France, Belgium, Holland, Luxembourg, Switzerland.
Demag Aktiengesellschaft, Duisburg, Germany — Germany, Austria, Yugoslavia, Greece, Turkey, Egypt.
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Designers and Builders to the Ferrous, Non-Ferrous, Leather, Rubber, and Plastic Industries

This hole means savings —instead of shavings

THE hole in the tube above should have been packed full of money. It would have been a quick way to show you some of the money you'll save when you switch to Timken® seamless steel tubing for your hollow parts jobs.

Because the hole's already there, you eliminate practically all of the scrap you have to drill out when you use bar stock—the steel you pay for but don't use.

Because the hole's already there, you can start with finish boring. You can make your hollow parts faster, with less equipment and fewer production steps.

Because the hole's already there, screw machine stations and men are available for other operations. You add machine capacity without adding machines. You use your employees more efficiently.

To make sure you get every penny's worth of steel for your dollar, our engineers will be glad to study your operation and recommend the most economical tube size for your hollow parts job—guaranteed to clean up to finish dimensions.

Timken seamless steel tubing gives you a better quality product, too. The piercing operation by which it's made is basically a forging operation. This gives the tubing a uniform spiral grain flow and a refined grain structure that brings out the best in the quality of the metal. And this quality is uniform from tube to tube and heat to heat because of the Timken Company's rigid quality control. The Timken Roller Bearing Company, Steel and Tube Division, Canton 6, Ohio. Cable address: "TIMROSCO".

YEARS AHEAD—THROUGH EXPERIENCE AND RESEARCH

SPECIALISTS IN FINE ALLOY STEELS, GRAPHITIC TOOL STEELS AND SEAMLESS TUBING